Piece rates, salaries and tournaments: economic and psychological competition in a real effort task

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How should you pay someone?

- Piece rates
  - Output – Pay based on absolute performance
  - Input – Pay based on time
- Salary
  - Pay independent of performance; no ***extrinsic*** incentive
- Tournaments
  - Pay based on relative performance;
  - Winner take all; Rank-order
  - *Lazear and Rosen (1981); Green and Stokey, (1983); Nalebuff and Stiglitz (1983)*

Voluminous literature looking at incentive mechanisms

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- Field studies
  - Executive positions (Gibbons and Murphy, 1990), Chicken farmers (Knoeber, 1989, 1994), Law firms (Ferrall, 1996), Portfolio managers (Brown, 1996), Executives (Xu, 1997), Etc.
- Experimental work
  - Bull, Schotter and Weigelt (1987)
  - Harbring and Irlenbusch (2003)
  - Van Dijk et al (2001)
- Surveys
  - Prendergast (1999), Dechenaux, Kovenock, Sheremeta (2012)

Three ways tournaments differ from piece rates

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- ***Psychological competition***
  - Act of competing against another
  - pleasure of winning/ pain of losing

- ***Economic competition***
  - Performance dependent payoffs
  - "Bad" decisions leading to low payoff

- ***Information***
  - Information about how well you are doing
  - How well it is possible to do
  - Provides a reference for identifying attainable level

Objectives of our study

- ***Study performance under different incentive schemes***
- Using a "real effort task"
- Cognitively difficult task ->
- People need to expend "effort" to perform the task well

The task used in this study

- Multiple Cue Probabilistic Learning Task
- In each round subjects asked to forecast price of fictitious "stock" given two cue-values A and B
- Stock price:
- $P_t^* = 10 + 0.3*CUE\ A_t + 0.7*CUE\ B_t + e_t$

The task used in this study

- Cue values change each round, but ***not*** the underlying relationship
- ***Metric of good decision (good performance) ->***
- ***Absolute forecasting error:***
- $e_{it} = |P_t^* - P_{it}|$

Experimental design

- Computerized experiments
- $5 show up fee
- Instructions read out loud
- 5 minutes to study 10 examples of Price/Cue relationship provided on paper
- Experiment starts after that

Experimental design

- Shown Cue A and Cue B for 1st round
- Given time to enter decisions
- Results displayed
- New cue values for second round and so on
- Continue for 20 rounds

Three types of payment schemes

- ***Piece rate:***
- $Earning_{it} = \$1.00 - e_{it}$

- ***Two person (winner take all) tournament:***
- $Earning_{it} = \$1.00$ *if* $|e_{it}| < |e_{jt}|$
  $= \$0.00$ *otherwise*
- ***Salary***
- Earnings = $20 (announced before-hand)

Treatments

- ***Piece rates***
- ***Piece rates with win-loss information (Win-Lose)***
- ***Tournament***
- ***Tournament no information***
- ***Salary***
- ***Salary with win-loss information***

Piece rates

- Rounds 1 – 20
- Payment based on own absolute errors only
- $Earning_{it} = \$1.00 - e_{it}$
- If absolute error > 100 then receive $0

Win-Lose

- ***Rounds 1 – 5***
- Piece rate payment scheme exactly as before

- ***Rounds 6 – 20***
- Assigned partner each round; ***anonymous***
- Partners randomly re-matched each period,
- Same piece rate payment scheme but
- At the end of the round subjects learn

1. ***Earnings***
2. ***WIN or LOSE*** *(whether one's own error was smaller (larger) than pair member's error)*

Tournament

- ***Rounds 1 – 5***
- Piece rate payment scheme exactly as before

- ***Rounds 6 - 20***
- Assigned partner each round
- Provided extra $4.00 in earnings account
- At the end of the round subjects learn

1. ***Error***
2. ***WIN or LOSE***
3. ***Payment = $1.00 or $0.00***

Tournament no information

- ***Rounds 1 – 5***
- Piece rate payment scheme exactly as before

- ***Rounds 6 - 20***
- Assigned partner each round
- Provided extra $4.00 in earnings account
- At the end of the round subjects learn

1. Error

- At the end of ROUND 20 subjects learn

1. WIN or LOSE

2. Payment = $1.00 or $0.00 for each round

Salary

- Rounds 1 - 20
- Flat $20 payment announced at the beginning
- Shown earnings based on Piece Rate
- At the end of the round subjects learn

1. Error

2. Earnings

- But made clear that they receive a flat amount at the end regardless of errors or "per round earnings"

Salary with Win-Loss

- Rounds 1 - 20
- Flat $20 payment announced at the beginning
- Shown earnings based on Piece Rate
- At the end of the round subjects learn
- ***Error***
- ***Earnings***
- ***Win or Lose***
- But made clear that they receive a flat amount at the end regardless of errors or "per round earnings"

Questions

1. ***Is winning/losing important in pay for performance schemes?***
   - Piece rate vs. Win/Lose
   - Incentives the same, information different

2. ***Are payoffs important when paying for performance?***
   - Win/Lose vs. Tournament
   - Information same, incentives different

Questions

3. ***Is information in tournaments important?***
   - Tournament vs. Tournament No Info
   - Incentives the same, but info different

4. ***Extrinsic versus intrinsic motivation***
   - Compare piece rate with salary

5. ***Is winning/losing important when pay is independent of performance?***
   - Compare Salary vs. Salary Win-Lose

Questions

- Collect demographic information along with gender

- Prior to start of game, we measure

1. ***Trait Anxiety***

- Following game, we measure

1. ***Motivation***
2. ***Effort***
3. ***Competence***
4. ***Interest***

Experimental design

- Two separate experiments with 376 subjects
- *Experiment #1 with 176 subjects*
- **Here both cue values change from one round to the next**
- *Experiment #2 with 200 subjects*
- Here Cue A ***fixed at 150***; only Cue B changes

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Overview of Results

	Single Cue		*Dual Cue*		*Overall*
	n	Average Errors	n	Average Errors	Average Errors
Piece Rate	42	10.2	39	26.6	18.1
Win-Loss	*42*	*9.6*	*35*	*24.0*	*16.2*
Tournament	40	10.0	38	30.7	20.1
Salary	*42*	*9.0*	*34*	*25.1*	*16.2*
Salary Win-Loss	34	10.2	30	31.4	20.2

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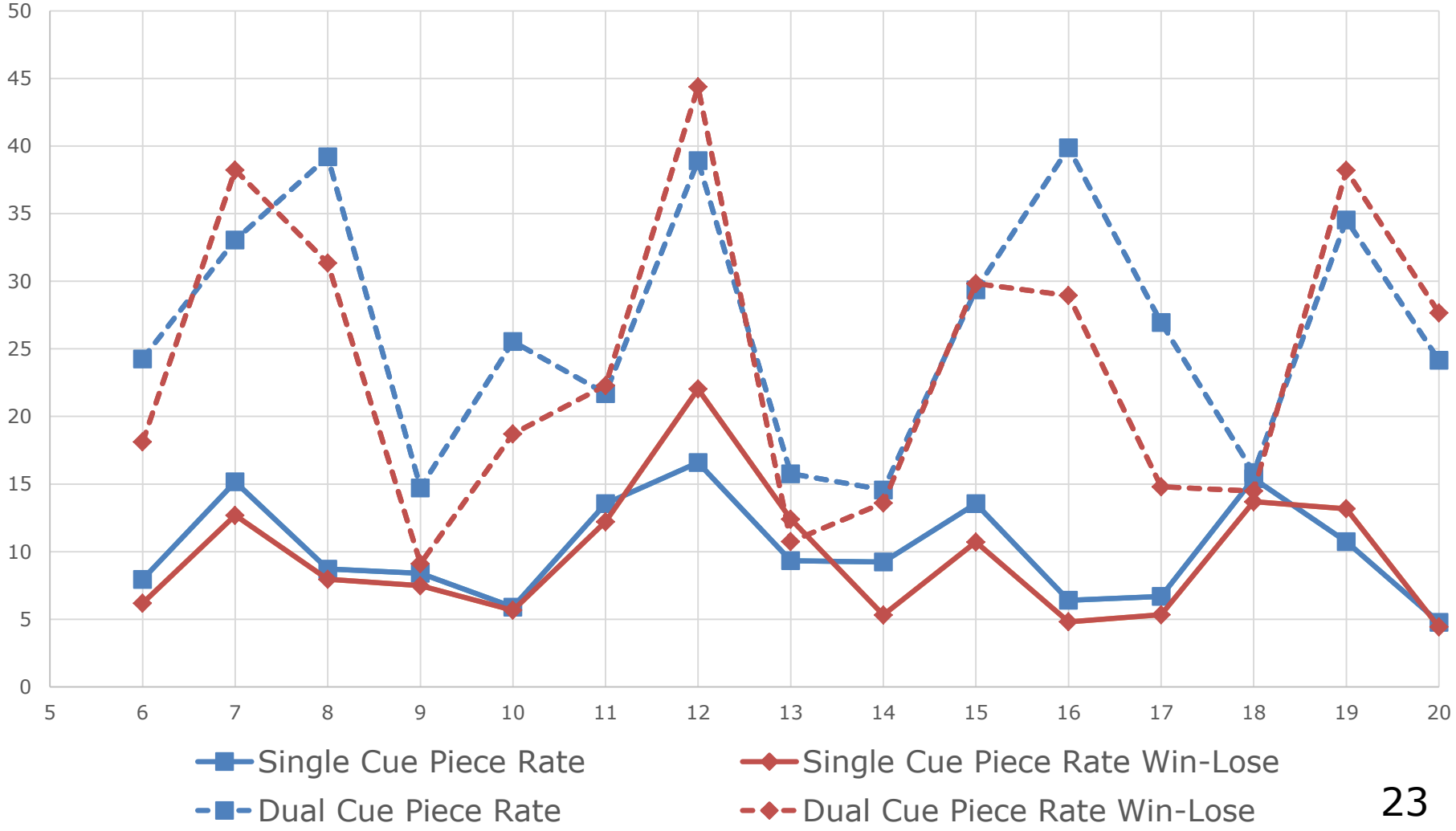
Piece Rate vs Piece-Rate Win-Lose



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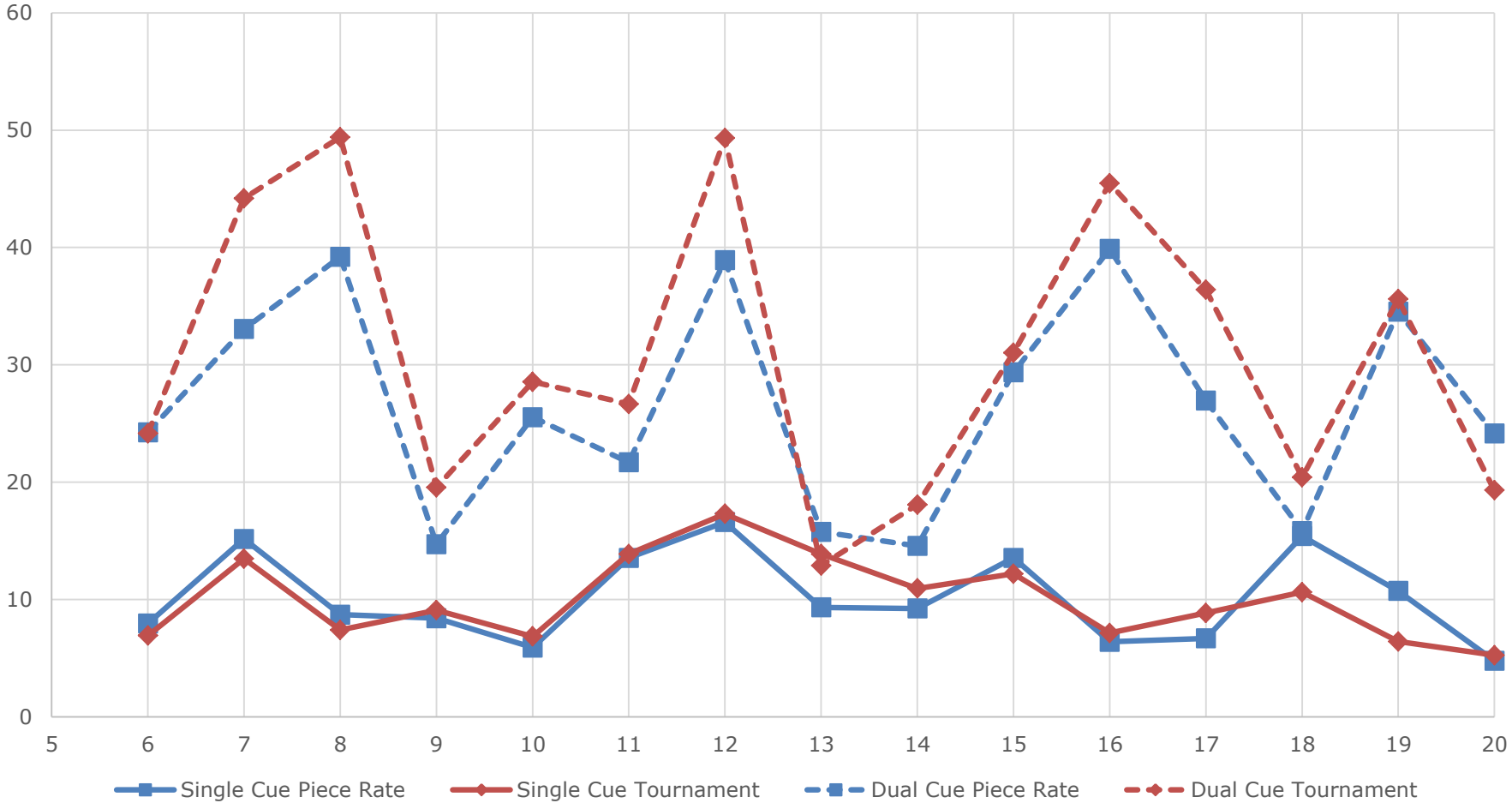
Piece-Rate Win-Lose vs Tournament



Dual Cue Tournament Vs Tournament No Information

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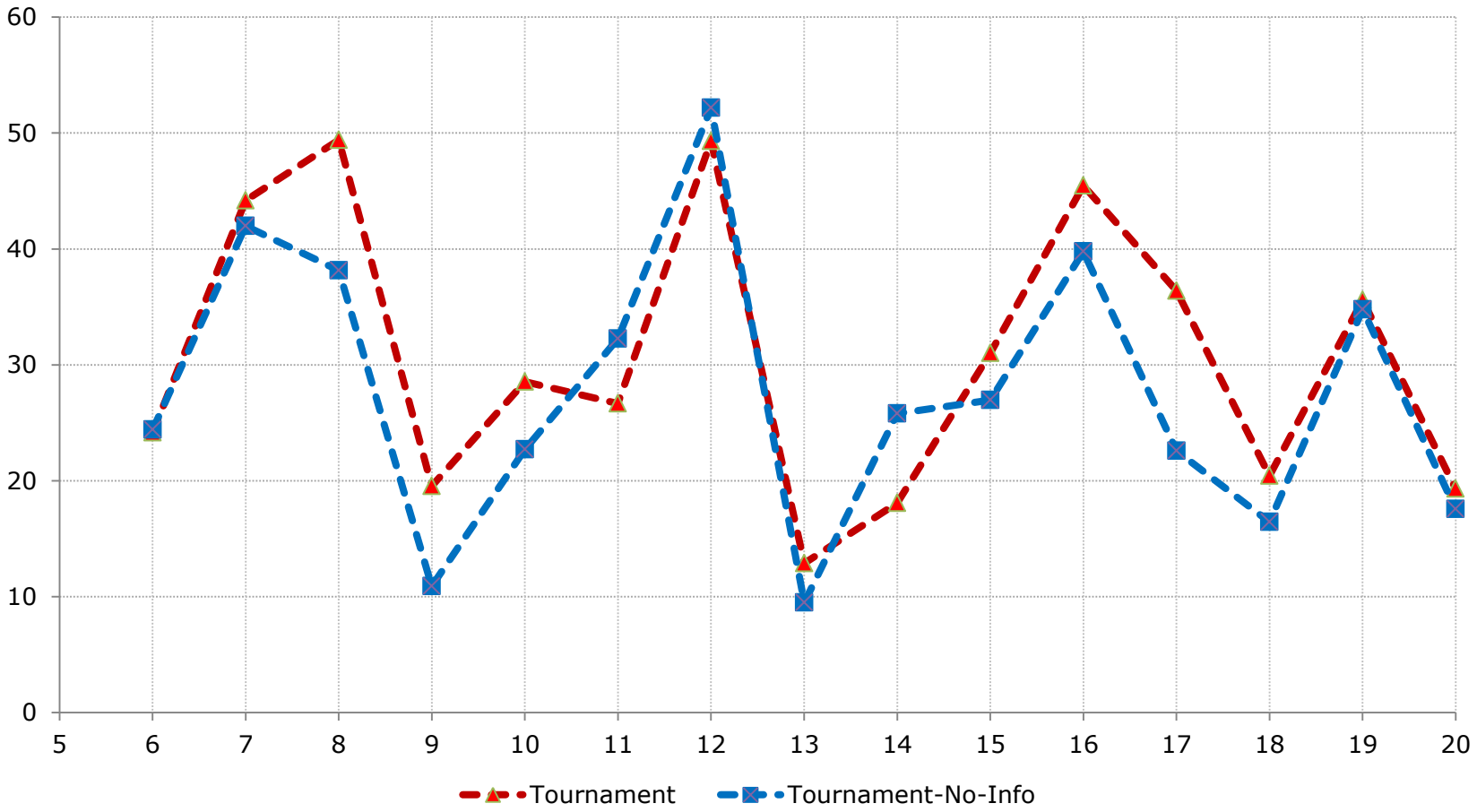

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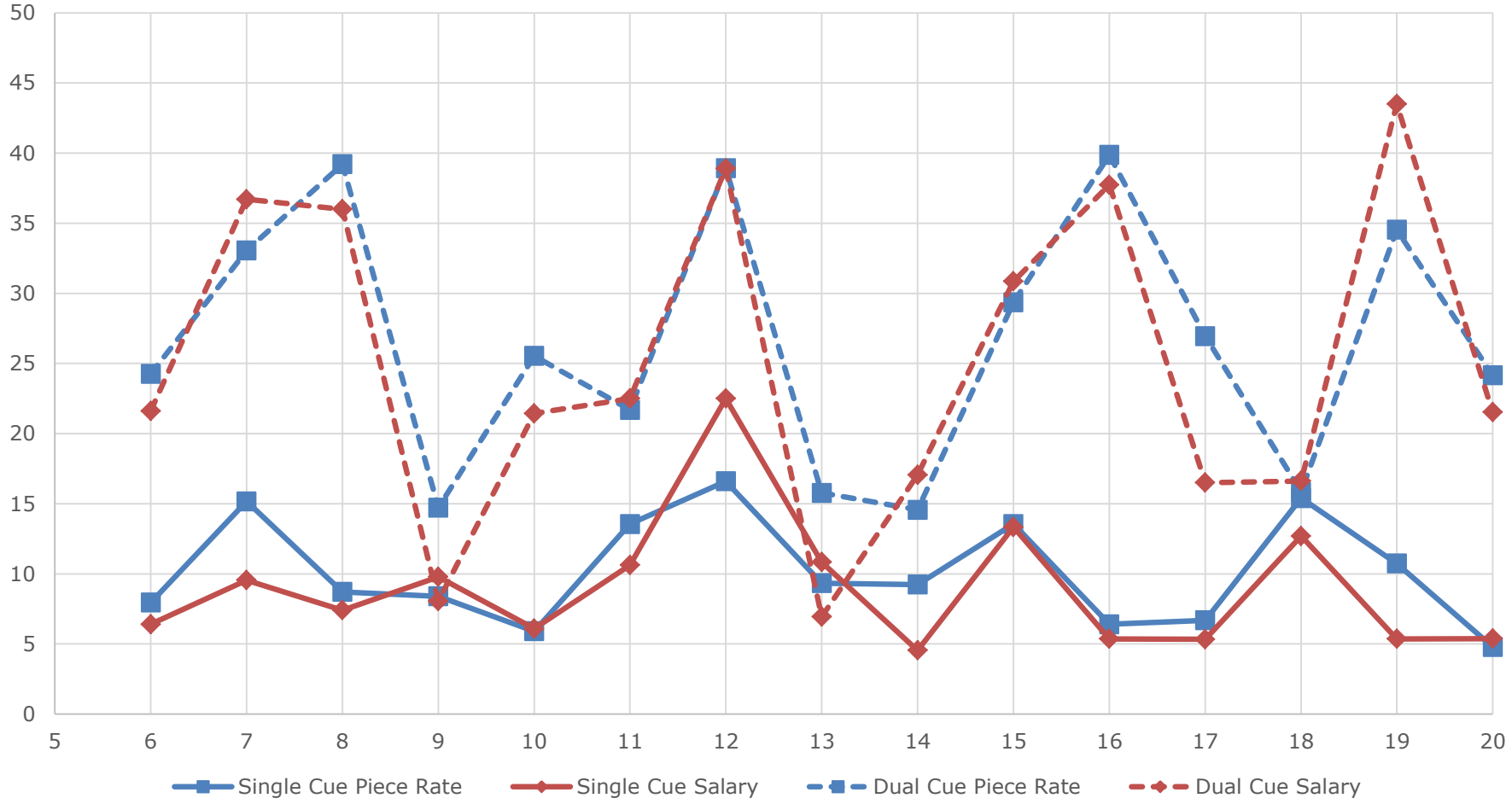
Piece Rate vs Salary



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Salary vs Salary-Win-Lose

Dependent variable: Absolute forecast error (All Data)

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	Model 1	Model 2	Model 3	Model 4
Piece Rate Win-Lose	-1.84	-1.79	***-3.92****	***-5.49****
	(2.10)	(2.03)	***(2.23)***	***(2.99)***
Tournament	2.04	1.15	0.10	3.14
	(2.66)	(2.68)	(2.90)	(3.16)
Salary	-1.80	-4.21	***-6.00****	***-7.34****
	(2.09)	(2.78)	***(2.91)***	***(3.00)***
Salary Win-Lose	2.13	-0.29	-1.55	-2.84
	(2.62)	(3.20)	(3.46)	(3.30)
Cuespread	0.08***	0.08***	0.08***	0.08***
	(0.00)	(0.01)	(0.01)	(0.01)
Lagged Earnings		-2.94 *	-2.50	-2.63
		(1.60)	(1.64)	(1.65)
Trait Anxiety			0.10	0.10
			(0.11)	(0.11)
Female			***6.46****	***6.45****
			(1.35)	***(1.34)***
Round	0.17 ***	0.17 ***	0.17 **	0.15
	(0.06)	(0.06)	(0.07)	(0.14)
Constant	6.39 ***	8.48 ***	2.01	2.27
	(1.91)	(2.66)	(4.34)	(4.61)
With treatment-round interactions	No	No	No	***Yes***
Observations	5640	5640	5130	5130
Participants	376	376	342	342
R^2	0.082	0.090	0.110	0.110

p-values for Wald χ^2 test on treatment dummy coefficients

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	Model 1	Model 2	Model 3	Model 4
P(PRWL = 0)	0.38	0.379	***0.079***	***0.067***
P(PRWL = T)	0.093	0.184	***0.076***	***0.008***
P(PRWL = S)	*0.977*	*0.252*	*0.310*	*0.552*
P (S = 0)	0.391	0.13	***0.04***	***0.015***
P (S = SWL)	0.082	0.082	***0.06***	***0.09***

Dependent Variable: Absolute Forecast error (Dual cue)

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	Model 1	Model 2	Model 3	Model 4
Piece Rate Win-Lose	-2.53	-2.43	-4.26	-6.51
	(3.43)	(3.28)	(3.35)	(4.82)
Tournament	4.17	3.00	1.68	6.86
	(4.41)	(4.35)	(4.57)	(4.79)
Salary	-1.50	-5.27	-7.28	***-10.22 ******
	(3.40)	(4.40)	(4.54)	***(4.95)***
Salary Win-Lose	4.87	1.10	2.07	-4.42
	(4.32)	(5.14)	(5.37)	(5.03)
Cuespread	0.11 ***	0.11 ***	0.12 ***	0.12 ***
	(0.01)	(0.01)	(0.01)	(0.01)
Lagged Earnings		-5.06 *	-3.80	-3.95
		(2.65)	(2.57)	(2.61)
Trait Anxiety			0.07	0.07
			(0.17)	(0.17)
Female			8.69 ***	8.68 ***
			(2.14)	(2.14)
Round	0.52 ***	0.52 ***	0.54 ***	0.47 *
	(0.11)	(0.11)	(0.12)	(0.24)
Constant	3.71	7.43 *	-0.85	0.16
	(3.30)	(4.39)	(6.85)	(7.26)
With treatment-round interactions	No	No	No	***Yes***
Observations	2640	2640	2430	2430
Participants	176	176	162	162
R^2	0.107	0.110	0.137	0.138
p(PRWL = T)	0.069	0.119	***0.092***	***0.013***
p(S = 0)	0.660	0.231	***0.109***	***0.039***
p(S = SWL)	***0.073***	***0.073***	***0.017***	***0.249***

Dependent Variable: Absolute Forecast error (Single cue)

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Dep Var: Forecast Error	Single Cue	Single Cue	Single Cue	Single Cue
Piece Rate Win-Lose	-0.56	-0.55	-1.32	-2.88
	(1.49)	(1.48)	(1.71)	(3.31)
Tournament	-0.15	-0.56	-0.85	-0.15
	(1.66)	(1.64)	(1.95)	(3.25)
Salary	-1.15	-2.16	***-3.29****	-3.84
	(1.35)	(1.71)	***(1.88)***	(3.08)
Salary Win-Lose	0.06	-0.95	-2.29	0.47
	(1.47)	(1.81)	(1.95)	(3.67)
Cuespread	0.02 ***	0.02 ***	0.02 ***	0.02 ***
	(0.00)	(0.00)	(0.00)	(0.00)
Lagged Earnings		-1.13	-1.41	-1.44
		(1.14)	(1.25)	(1.24)
Trait Anxiety			0.03	0.03
			(0.09)	(0.09)
Female			1.31	1.30
			(1.01)	(1.01)
Round	-0.10 *	-0.10 *	-0.12 **	-0.11
	(0.06)	(0.06)	(0.06)	(0.14)
Constant	8.74 ***	9.79 ***	9.35 **	9.22 *
	(1.46)	(1.78)	(4.19)	(4.87)
With treatment-round interactions	No	No	No	Yes
Observations	3000	3000	2700	2700
Participants	200	200	180	180
R^2	0.018	0.020	0.025	0.026
p(S = 0)	0.394	0.206	***0.080***	0.211

High versus low performers Combined data

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- Why do tournaments not perform well in general*?*
- It appears that those who are good at the task perform about the same in all treatments
- But those who are not good perform better in Win-Lose and Salary
- What does it mean to say – good or bad at the task?

High versus low performers Combined data

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- Because everyone plays under a piece-rate condition during the first five rounds, we can look at performance in those rounds to split people up into "high" and "low" performers

- Split by Mean or Median?
  - *Data positive/right skewed (long right tail)*

- Below we present results for combined data and those above and below the mean
  - ***Mean (Median) error or higher -> LOW performer***
  - ***Lower than Mean (Median) -> HIGH performer***

Kernel Density Plots

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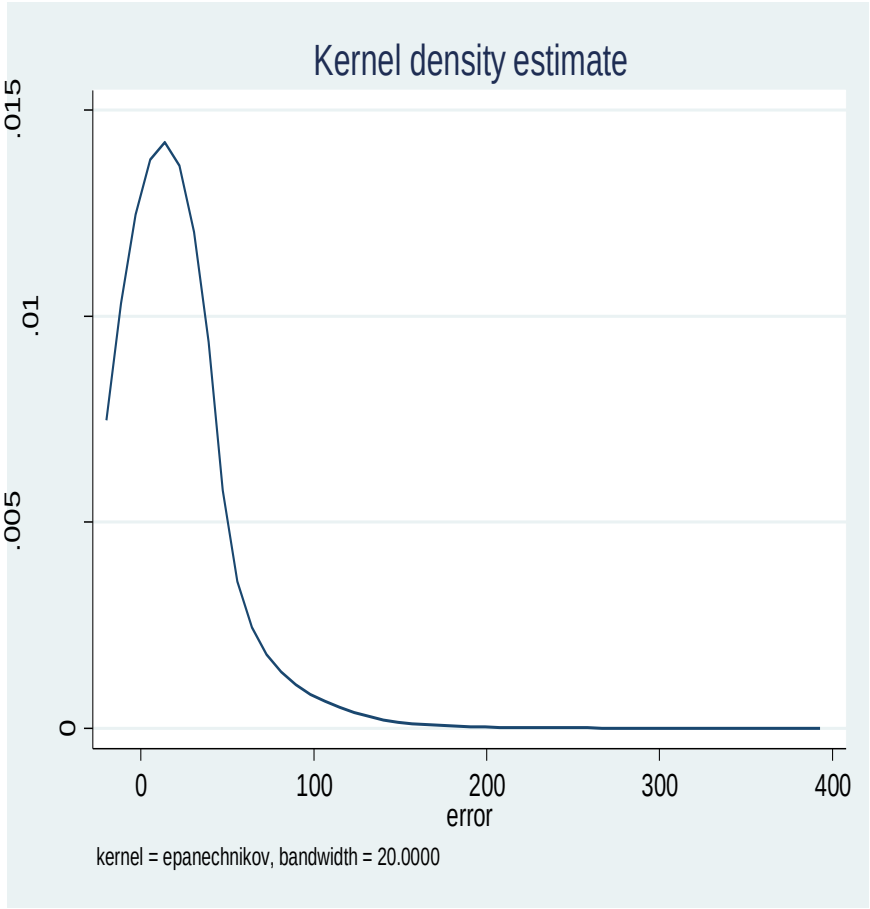
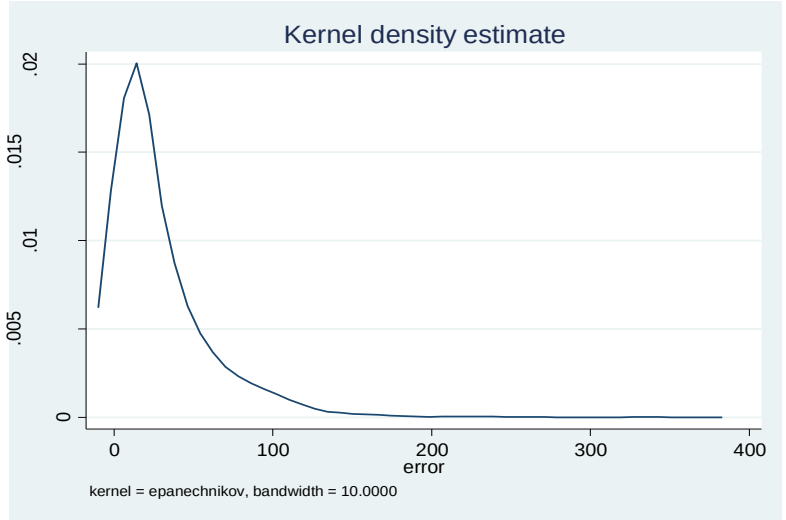
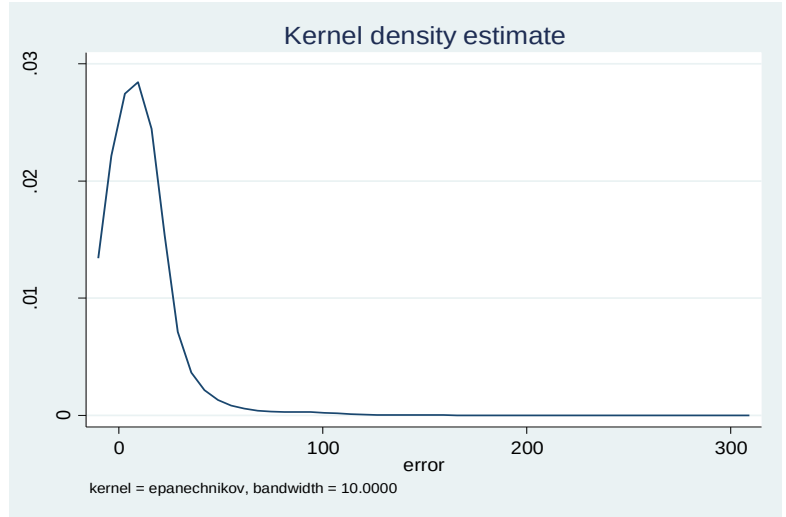
DUAL CUE







ALL

SINGLE CUE

Regression of errors for high performers (mean split)

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Dep Var: Forecast Error	High Perf	High Perf	High Perf	High Perf
Piece Rate Win-Lose	2.63 *	2.55 *	1.50	2.19
	(1.48)	(1.45)	(1.59)	(2.43)
Tournament	2.14	1.30	1.23	3.73
	(1.68)	(1.59)	(1.76)	(2.65)
Salary	0.76	0.74	0.09	0.80
	(1.35)	(1.31)	(1.36)	(2.18)
Salary Win-Lose	-0.17	-0.15	-1.31	1.07
	(1.26)	(1.23)	(1.34)	(2.57)
Cuespread	0.05 ***	0.05 ***	0.05 ***	0.05 ***
	(0.00)	(0.01)	(0.01)	(0.01)
Lagged Earnings		-2.54 *	-2.58 *	-2.65 *
		(1.43)	(1.55)	(1.56)
Trait Anxiety			0.08	0.08
			(0.07)	(0.07)
Female			2.71 **	2.71 **
			(1.06)	(1.06)
Round	-0.03	-0.03	-0.06	0.03
	(0.05)	(0.05)	(0.05)	(0.09)
Constant	4.61 ***	6.68 ***	3.07	1.95
	(1.13)	(1.74)	(3.37)	(3.63)
With treatment-round interactions	No	No	No	Yes
Observations	3240	3240	2940	2940
Participants	216	216	196	196
R^2	0.079	0.085	0.100	0.101
p(PRWL = 0)	0.076	0.078	0.346	0.367
p(PRWL = T)	0.787	0.452	0.873	0.560
p(PRWL = SWL)	0.044	0.045	0.029	0.662
p(S = 0)	0.572	0.570	0.949	0.716
p(S = SWL)	0.456	0.460	0.192	0.906

Regression of errors for low performers (mean split)

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Dep Var: Forecast Error	Low Perf	Low Perf	Low Perf	Low Perf
Piece Rate Win-Lose	-4.54	-3.99	***-6.24 ******	***-12.45 ******
	(3.77)	(3.37	***(3.60)***	***(6.38)***
Tournament	3.32	0.18	-1.74	2.57
	(4.81)	(4.54	(4.72)	(5.30)
Salary	-4.26	-3.83	***-7.17 ******	***-10.71 ******
	(3.55)	(3.17	***(3.62)***	***(4.75)***
Salary Win-Lose	0.63	0.58	0.24	-3.53
	(4.19)	(3.82	(4.12)	(4.50)
Cuespread	0.11 ***	0.11 ***	0.11 ***	0.11 ***
	(0.01)	(0.01	(0.01)	(0.01)
Lagged Earnings		-11.36 ***	-10.63 ***	-10.61 ***
		(3.44	(3.39)	(3.42)
Trait Anxiety			0.06	0.06
			(0.15)	(0.15)
Female			5.91 ***	5.92 **
			(2.31)	(2.31)
Round	0.45 ***	0.45 ***	0.48 ***	0.36
	(0.13)	(0.12)	(0.13)	(0.29)
Constant	8.23 **	15.95 ***	9.96	11.53 *
	(3.53)	(4.83)	(6.35)	(6.90)
With treatment-round interactions	No	No	No	Yes
Observations	2400	2400	2190	2190
Participants	160	160	146	146
R^2	0.091	0.109	0.121	0.122
p(PRWL = 0)	0.229	0.237	0.082	0.051
p(PRWL = T)	0.066	0.270	0.244	0.032
p(PRWL = SWL)	0.147	0.155	0.052	0.154
p(S = 0)	0.230	0.228	0.048	0.024
p(S = SWL)	0.142	0.141	0.027	0.121

Regression of errors for high performers (median split)

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Dep Var: Forecast Error	High Perf	High Perf	High Perf	High Perf
Piece Rate Win-Lose	1.58	1.58	1.16	2.15
	(1.09)	(1.09)	(1.26)	(1.78)
Tournament	0.96	1.01	1.12	1.14
	(1.22)	(1.26)	(1.55)	(2.46)
Salary	1.98 *	1.98 *	1.24	2.14
	(1.16)	(1.15)	(1.07)	(2.01)
Salary Win-Lose	-0.04	-0.04	-0.39	-0.51
	(0.74)	(0.74)	(0.93)	(1.70)
Cuespread	0.03 ***	0.03 ***	0.03 ***	0.03 ***
	(0.00)	(0.00)	(0.00)	(0.00)
Lagged Earnings		0.15	0.44	0.47
		(1.26)	(1.44)	(1.43)
Trait Anxiety			0.03	0.03
			(0.05)	(0.05)
Female			1.22	1.22
			(0.95)	(0.96)
Round	0.00	0.00	-0.03	0.01
	(0.04)	(0.04)	(0.04)	(0.09)
Constant	4.11 ***	3.87 ***	2.27	1.80
	(0.77)	(1.29)	(2.32)	(2.70)
With treatment-round interactions	No	No	No	Yes
Observations	1950	1950	1740	1740
Participants	130	130	116	116
R^2	0.048	0.048	0.053	0.053
p(PRWL = 0)	0.148	0.148	0.358	0.229
p(PRWL = T)	0.672	0.706	0.981	0.676
p(PRWL = SWL)	0.138	0.138	0.190	0.105
p(S = 0)	0.086	0.086	0.249	0.289
p(S = SWL)	0.080	0.080	0.125	0.169

Regression of errors for low performers (median split)

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Dep Var: Forecast Error	Low Perf	Low Perf	Low Perf	Low Perf
Piece Rate Win-Lose	-3.49	-3.15	***-4.78****	***-7.43****
	(2.78)	(2.53)	***(2.66)***	***(4.05)***
Tournament	2.30	-0.34	-1.50	3.27
	(3.52)	(3.38)	(3.50)	(3.86)
Salary	-2.42	-2.21	-4.56	***-7.02****
	(2.78)	(2.54)	(2.80)	***(3.66)***
Salary Win-Lose	1.25	1.18	0.98	-0.18
	(3.31)	(3.06)	(3.37)	(3.57)
Cuespread	0.09 ***	0.10 ***	0.10 ***	0.10 ***
	(0.01)	(0.01)	(0.01)	(0.01)
Lagged Earnings		-9.28 ***	-8.86 ***	-8.94 ***
		(2.37)	(2.37)	(2.39)
Trait Anxiety			0.02	0.02
			(0.12)	(0.12)
Female			6.81 ***	6.80 ***
			(1.61)	(1.61)
Round	0.27 ***	0.28 ***	0.29 ***	0.27
	(0.09)	(0.09)	(0.09)	(0.20)
Constant	7.73 ***	14.07 ***	9.68 *	9.90 *
	(2.64)	(3.54)	(5.09)	(5.50)
With treatment-round interactions	No	No	No	Yes
Observations	3690	3690	3390	3390
Participants	246	246	226	226
R^2	0.093	0.114	0.130	0.131
p(PRWL = 0)	0.209	0.213	0.072	0.066
p(PRWL = T)	0.054	0.300	0.222	0.013
p(PRWL = SWL)	0.085	0.086	0.032	0.070
p(S = 0)	0.383	0.383	0.103	0.055
p(S = SWL)	0.182	0.178	0.047	0.057

Improvements in performance according to task difficulty

- Okay so tournaments do not do well overall
- But do tournaments perform relatively better when the task is easier?
- We can compare improvements in performance across the different tasks
- Many ways of doing this: we look at pairs of treatments and the differences in errors

Piece Rate Win-Lose vs Tournament across task difficulty

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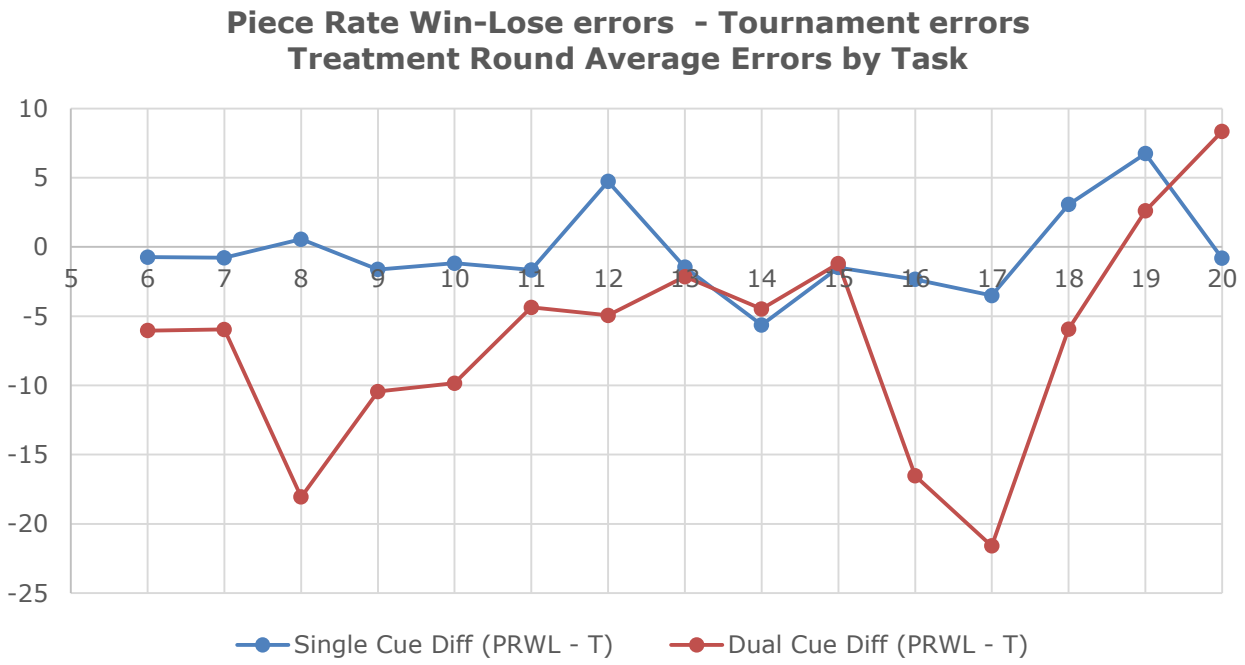
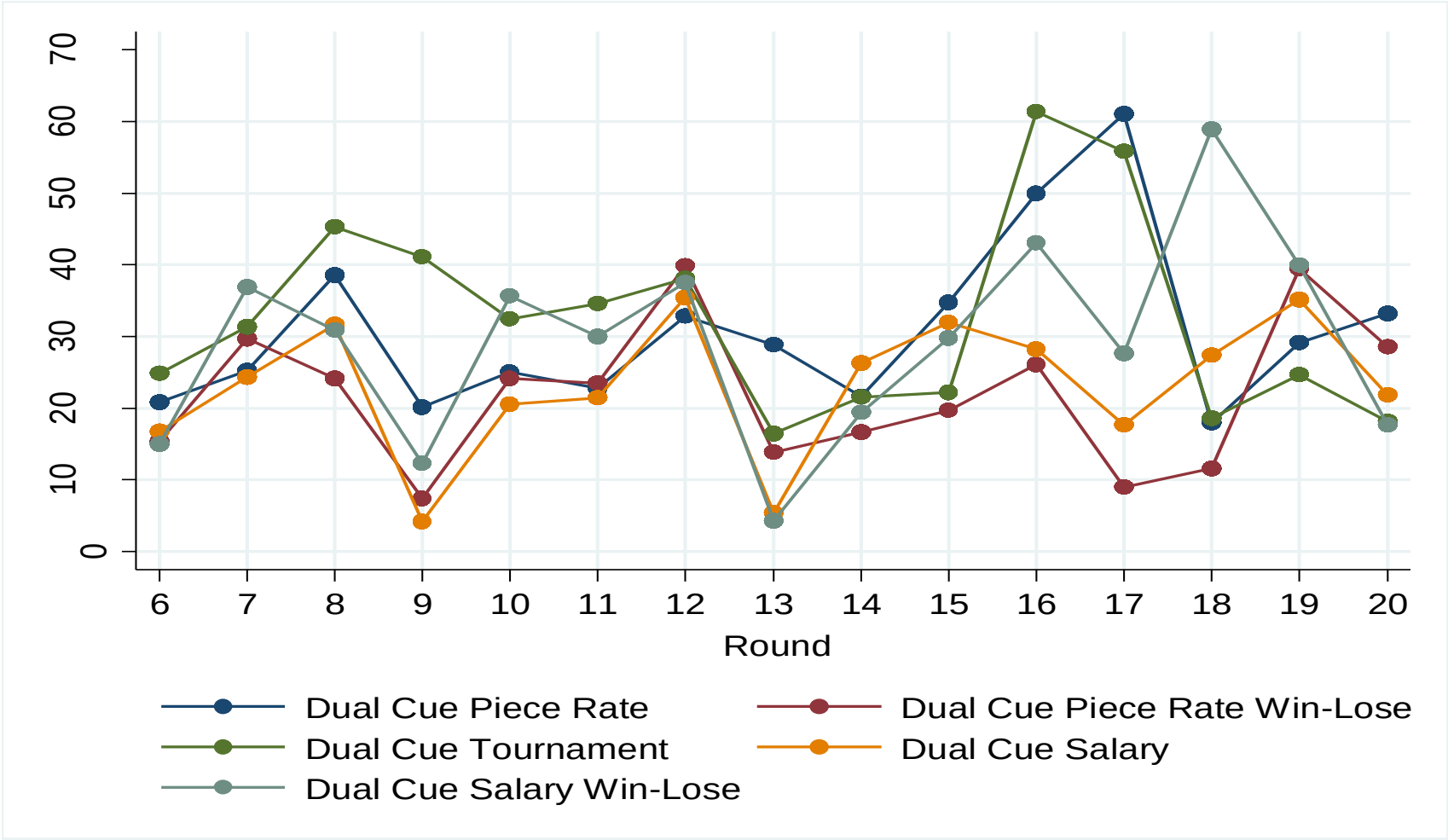
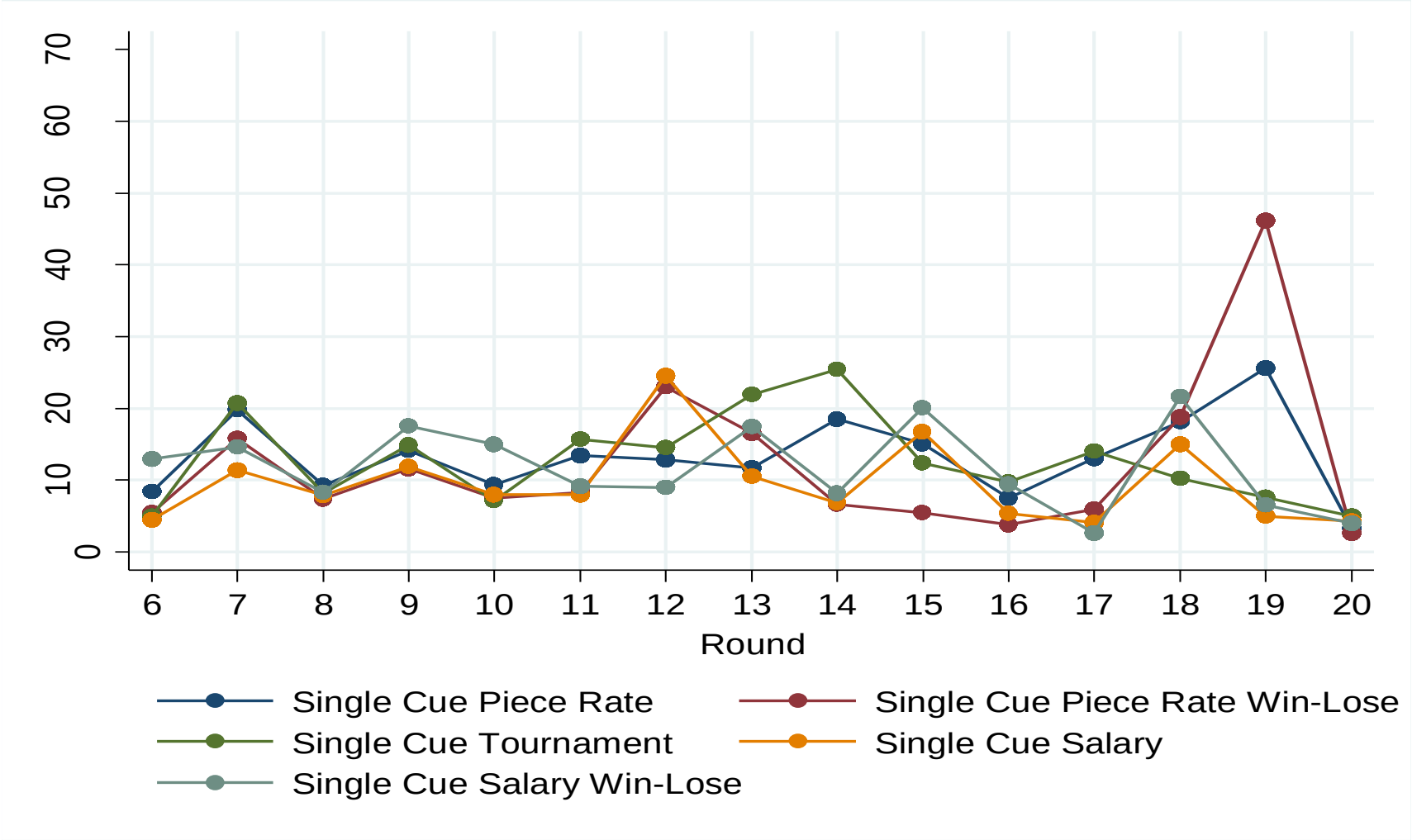


	Single Cue	Dual Cue	Ranksum
PRWL - T	-0.412 (3.135)	-6.707 (7.791)	|z| = 3.007 p = 0.0026

Learning over time?



Learning over time?



Dependent variable: Absolute forecast error

All Data – Partial Results for interaction terms

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	Model 1 Rounds 5 - 20	Model 2 Rounds 11 - 20	Model 3 Rds 11–20 HIGH Perf (mean)	Model 4 Rds 11 – 20 LOW Perf (mean)
Round	0.176 (0.141)	0.490 ** (0.213)	0.038 (0.188)	0.652 (0.400)
Win-lose_round	0.112 (0.205)	-0.038 (0.370)	-0.239 (0.280)	0.438 (0.954)
Tournament_round	-0.294 (0.183)	-0.570 ** (0.282)	-0.541 ** (0.225)	-0.658 (0.553)
Salary_round	0.078 (0.183)	-0.041 (0.328)	-0.407 (0.287)	0.415 (0.662)
Salary Win-Lose_round	0.068 (0.212)	0.174 (0.318)	-0.160 (0.242)	0.244 (0.589)
Constant	6.494 (4.381)	5.287 (5.470)	5.616 (4.433)	7.124 (8.915)
Observations	5130	3420	1960	1460
Participants	342	342	196	146
R^2	0.128	0.104	0.069	0.116

Dependent variable: Absolute forecast error
All Data – Partial Results for interaction terms

THE UNIVERSITY OF AUCKLAND
BUSINESS SCHOOL

	Model 1 Rounds 5 - 20	Model 2 Rounds 11 - 20	Model 3 Rds 11–20 HIGH Perf	Model 4 Rds 11 – 20 LOW Perf
Round	0.176 (0.141)	***0.490***** ***(0.213)***	***-0.421******* ***(0.145)***	***0.644***** ***(0.294)***
Win-lose_round	0.112 (0.205)	-0.038 (0.370)	-0.402 (0.254)	0.210 (0.547)
Tournament_round	-0.294 (0.183)	***-0.570***** ***(0.282)***	***-0.429**** ***(0.244)***	***-0.722**** ***(0.397)***
Salary_round	0.078 (0.183)	-0.041 (0.328)	0.055 (0.260)	-0.062 (0.514)
Salary Win-Lose_round	0.068 (0.212)	0.174 (0.318)	-0.198 (0.203)	0.305 (0.443)
Constant	6.494 (4.381)	5.287 (5.470)	10.268 *** (3.696)	7.217 (7.048)
Observations	5130	3420	1160	2260
Participants	342	342	116	226
R^2	0.128	0.104	0.058	0.116

Accuracy of forecasts

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Dep Var: Forecasts	Piece Rate	Win Lose	Tournament	Salary	Salary win-Lose
Cue A	0.34***	0.32***	0.30***	0.33***	0.36***
	(0.02)	(0.01)	(0.02)	(0.02)	(0.02)
Cue B	0.63***	0.65***	0.62***	0.64***	0.61***
	(0.02)	(0.01)	(0.02)	(0.01)	(0.02)
Constant	17.53***	15.13***	25.80***	17.53***	17.81***
	(4.51)	(1.96)	(5.28)	(2.00)	(3.57)
Observations	1215	1155	1170	1140	960
Participants	81	77	78	76	64
R^2	0.873	0.906	0.846	0.910	0.860
Wald Chi^2	2018.92	11242.88	1465.87	8314.48	2321.44
$p > chi^2$	0.000	0.000	0.000	0.000	0.000
p(cue A = 0.3)	0.023	0.148	0.835	0.047	0.005
p(cue B = 0.7)	0.000	0.000	0.000	0.000	0.000
p(cons = 10)	0.095	0.009	0.003	0.000	0.029

High Performers

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Dep Var: Forecasts	Piece Rate	Win Lose	Tournament	Salary	Salary win-Lose
Cue A	0.32 ***	0.33 ***	0.30 ***	0.27 ***	
	(0.02)	(0.01)	(0.03)	(0.01)	
Cue B	0.68 ***	0.67 ***	0.68 ***	0.70 ***	0.73 ***
	(0.01)	(0.01)	(0.02)	(0.01)	(0.01)
Constant	10.76 ***	10.91 ***	12.14 **	14.77 ***	47.77 ***
	(1.97)	(2.36)	(5.05)	(2.84)	(1.90)
Observations	675	780	690	660	435
Participants	45	52	46	44	29
R^2	0.958	0.935	0.931	0.954	0.952
Wald Chi^2	7793.52	10004.43	2218.1	6774.69	5558.67
$p > chi^2$	0.000	0.000	0.000	0.000	0.0000
p(cue A = 0.3)	***0.309***	0.010	***0.922***	0.032	
p(cue B = 0.7)	***0.153***	0.019	***0.232***	0.835	0.007
p(cons = 10)	***0.701***	0.699	***0.671***	0.093	
p(cons = 55)					0.000

Low Performers

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Dep Var: Forecasts	Piece Rate	Win Lose	Tournament	Salary	Salary win-Lose
Cue A	0.35 ***	0.32 ***	0.33 ***	0.38 ***	0.38 ***
	(0.02)	(0.03)	(0.03)	(0.02)	(0.02)
Cue B	0.59 ***	0.63 ***	0.55 ***	0.58 ***	0.56 ***
	(0.02)	(0.02)	(0.03)	(0.02)	(0.02)
Constant	22.45 ***	19.03 ***	33.44 ***	19.83 ***	21.46 ***
	(7.25)	(3.50)	(9.40)	(2.74)	(3.95)
Observations	540	375	480	480	525
Participants	36	25	32	32	35
R^2	0.813	0.863	0.778	0.881	0.837
Wald Chi^2	750.86	5967.71	517.41	5117.51	1930.74
$p > chi^2$	0.000	0.000	0.000	0.000	0.000
p(cue A = 0.3)	0.019	***0.447***	***0.338***	0.000	0.000
p(cue B = 0.7)	0.000	0.000	0.000	0.000	0.000
p(cons = 10)	0.086	0.010	0.013	0.000	0.004

Why does Salary Win-Lose do worse? Data for rounds 6 - 20

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	Salary Dual Cue	Salary Win-Lose Dual Cue	Salary Single Cue	Salary Win-Lose Single Cue
Cuespread	0.123*** (0.016)	0.154*** (0.021)	0.010*** (0.004)	0.025*** (0.007)
Round	0.692*** (0.234)	0.998*** (0.316)	-0.071 (0.0756)	-0.275** (0.128)
Trait Anxiety	NS	NS	0.158* (0.088)	0.361*** (0.092)
Female	NS	NS	NS	NS
Lagged Earnings	***-10.95*** ***(7.068)***	***-23.001**** ***(9.168)***	***-2.365*** ***(4.982)***	***-13.23**** ***(7.51)***
Constant	13.131 (8.274)	8.468 (17.668)	2.364 (7.0661)	8.105 (8.813)
Observations	465	405	600	480
Participants	31	27	40	32
R^2	0.196	0.175	0.04	0.118

Concluding thoughts

- Across our two experiments by and large the treatments that perform better are "salary" and "win/lose" with salary doing better overall

- Part of the reason why tournaments do not perform well is because "low" performers fare especially poorly in this treatment

- Providing win/loss information in pay for performance schemes improves performance

Concluding thoughts

- However, providing win/loss information when payment is independent of performance actually makes things worse

- Tournament shows greater improvement in performance between dual and single cue tasks

- *This suggests that when a task is intellectually challenging tournaments may not do well but they might perform better if the task is more menial (?)*

Concluding thoughts

- Limited evidence of learning overall across different treatments
- But there is some evidence of learning in the tournament treatment particularly in the later rounds
- And this learning seems most pronounced for the "high" performers

Concluding thoughts

- Why does the salary treatment do well?

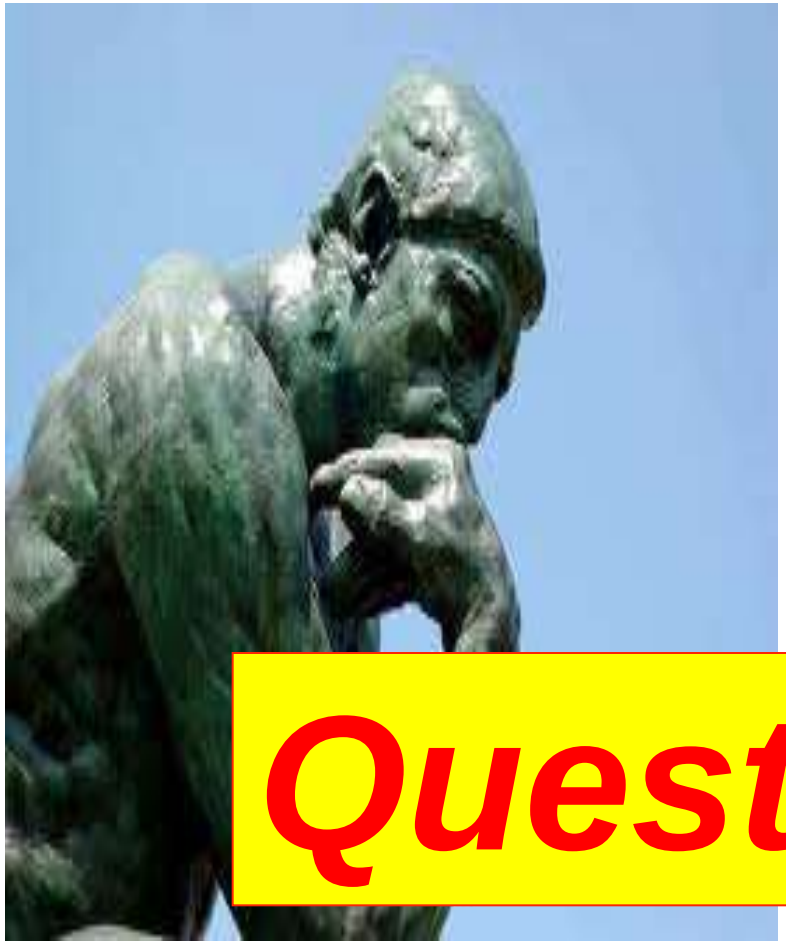
- Merlo and Schotter (1999)
  - ***Learn-while-you-earn*** *and* ***Learn-before-your-earn*** *(LBYE)*
    - *find that subjects do much better in the LBYE treatment where every single decision does not count for payment*

- *Why does Salary Win-Lose perform worse?*
  - *More myopic focus on per round earnings and winning/losing even when those do not matter?*
  - *Subjects feel "more controlled" when winning/losing information provided?*

Concluding thoughts
What is the aim?

- ***Minimize aggregate errors***
  - *If pay independent of performance, then* ***Salary***
  - *If pay dependent on performance, then* ***Win-Lose***
- ***Learning over time***
  - ***Tournaments***
  - *especially for "highly skilled" workers*

Well, that's my story and I am sticking to it



Questions?