

ONLINE APPENDIX for
DISAPPOINTMENT AVERSION AND
SOCIAL COMPARISONS IN A REAL-EFFORT COMPETITION

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Appendix A. INSTRUCTIONS

For all SOCIAL treatments we used the original GP instructions.¹ We also used the original z-Tree code developed by GP in SOCIAL1.² In SOCIAL2 and SOCIAL3 we modified the slider task to make the task easier, and in SOCIAL3 we replaced the code using a random number generator to select prizes with the actual prizes realized in the GP experiment.

Instructions for the SOCIAL Treatments (GP)

Please open the brown envelope you have just collected. I am reading from the four page instructions sheet which you will find in your brown envelope. **[Open brown envelope]**

Thank you for participating in this session. There will be a number of pauses for you to ask questions. During such a pause, please raise your hand if you want to ask a question. Apart from asking questions in this way, you must not communicate with anybody in this room. Please now turn off mobile phones and any other electronic devices. These must remain turned off for the duration of this session. Are there any questions?

You have been allocated to a computer booth according to the number on the card you selected as you came in. You must not look into any of the other computer booths at any time during this session. As you came in you also selected a white sealed envelope. Please now open your white envelope. **[Open white envelope]**

Each white envelope contains a different four digit Participant ID number. To ensure anonymity, your actions in this session are linked to this Participant ID number and at the end of this session you will be paid by Participant ID number. You will be paid a show up fee of £4 together with any money you accumulate during this session. The amount of money you accumulate will depend partly on your actions, partly on the actions of others and partly on chance. All payments will be made in cash in another room. Neither I nor any of the other participants will see how much you have been paid. Please follow the instructions that will appear shortly on your computer screen to enter your four digit Participant ID number. **[Enter four digit Participant ID number]** Please now return your Participant ID number to its envelope, and keep this safe as your Participant ID number will be required for payment at the end.

This session consists of 2 practice rounds, for which you will not be paid, followed by 10 paying rounds with money prizes. In each round you will undertake an identical task lasting 120 seconds. The task will consist of a screen with 48 sliders. Each slider is initially positioned at 0 and can be moved as far as 100. Each slider has a number to its right showing its current position. You can use the mouse in any way you like to move each

¹ Available for download at https://www.acaweb.org/aer/data/feb2012/20100346_app.pdf.

² Available for download at: https://www.acaweb.org/aer/data/feb2012/20100346_data.zip.

slider. You can readjust the position of each slider as many times as you wish. Your “points score” in the task will be the number of sliders positioned at exactly 50 at the end of the 120 seconds. Are there any questions?

Before the first practice round, you will discover whether you are a “First Mover” or a “Second Mover”. You will remain either a First Mover or a Second Mover for the entirety of this session.

In each round, you will be paired. One pair member will be a First Mover and the other will be a Second Mover. The First Mover will undertake the task first, and then the Second Mover will undertake the task. The Second Mover will see the First Mover's points score before starting the task.

In each paying round, there will be a prize which one pair member will win. Each pair's prize will be chosen randomly at the beginning of the round and will be between £0.10 and £3.90. The winner of the prize will depend on the difference between the First Mover's and the Second Mover's points scores and some element of chance. If the points scores are the same, each pair member will have a 50% chance of winning the prize. If the points scores are not the same, the chance of winning for the pair member with the higher points score increases by 1 percentage point for every increase of 1 in the difference between the points scores, while the chance of winning for the pair member with the lower points score correspondingly decreases by 1 percentage point. The table at the end of these instructions gives the chance of winning for any points score difference. Please look at this table now. **[Look at table]** Are there any questions?

During each task, a number of pieces of information will appear at the top of your screen, including the time remaining, the round number, whether you are a First Mover or a Second Mover, the prize for the round and your points score in the task so far. If you are a Second Mover, you will also see the points score of the First Mover you are paired with.

After both pair members have completed the task, each pair member will see a summary screen showing their own points score, the other pair member's points score, their probability of winning, the prize for the round and whether they were the winner or the loser of the round.

We will now start the first of the two practice rounds. In the practice rounds, you will be paired with an automaton who behaves randomly. Before we start, are there any questions?

Please look at your screen now. **[First practice round]** Before we start the second practice round, are there any questions? Please look at your screen now. **[Second practice round]** Are there any questions?

The practice rounds are finished. We will now move on to the 10 paying rounds. In every paying round, each First Mover will be paired with a Second Mover. The pairings will be changed after every round and pairings will not depend on your previous actions. You will not be paired with the same person twice. Furthermore, the pairings are done in such a way that the actions you take in one round cannot affect the actions of the people you will be paired with in later rounds. This also means that the actions of the person you are paired with in a given round cannot be affected by your actions in earlier rounds. (If you are interested, this is because you will not be paired with a person who was paired with someone who had been paired with you, and you will not be paired with a person who was paired with someone who had been paired with someone who had been paired with you, and so on.) Are there any questions?

We will now start the 10 paying rounds. There will be no pauses between the rounds. Before we start the paying rounds, are there any remaining questions? There will be no further opportunities to ask questions. Please look at your screen now. **[10 paying rounds]**

The session is now complete. Your total cash payment, including the show up fee, is displayed on your screen. Please leave the room one by one when asked to do so to receive your payment. Remember to bring the envelope containing your four digit Participant ID number with you but please leave all other materials on your desk. Thank you for participating.

Difference in points score	Chance of winning prize for Mover with higher score	Chance of winning prize for Mover with lower score
0	50%	50%
1	51%	49%
2	52%	48%
3	53%	47%
4	54%	46%
5	55%	45%
6	56%	44%
7	57%	43%
8	58%	42%
9	59%	41%
10	60%	40%
11	61%	39%
12	62%	38%
13	63%	37%
14	64%	36%
15	65%	35%
16	66%	34%
17	67%	33%
18	68%	32%
19	69%	31%
20	70%	30%
21	71%	29%
22	72%	28%
23	73%	27%
24	74%	26%
25	75%	25%
26	76%	24%
27	77%	23%
28	78%	22%
29	79%	21%
30	80%	20%
31	81%	19%
32	82%	18%
33	83%	17%
34	84%	16%
35	85%	15%
36	86%	14%
37	87%	13%
38	88%	12%
39	89%	11%
40	90%	10%
41	91%	9%
42	92%	8%
43	93%	7%
44	94%	6%
45	95%	5%
46	96%	4%
47	97%	3%
48	98%	2%
49	Not Possible as there are only 48 sliders	
50	Not possible as there are only 48 sliders	

Instructions for the ASOCIAL Treatments

Please open the brown envelope you have just collected. I am reading from the four page instructions sheet which you will find in your brown envelope. **[Open brown envelope]**

Thank you for participating in this session. There will be a number of pauses for you to ask questions. During such a pause, please raise your hand if you want to ask a question. Apart from asking questions in this way, you must not communicate with anybody in this room. Please now turn off mobile phones and any other electronic devices. These must remain turned off for the duration of this session. Are there any questions?

You have been allocated to a computer booth according to the number on the card you selected as you came in. You must not look into any of the other computer booths at any time during this session. As you came in you also selected a white sealed envelope. Please now open your white envelope. **[Open white envelope]**

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This session consists of 2 practice rounds, for which you will not be paid, followed by 10 paying rounds with money prizes. In each round you will undertake an identical task lasting 120 seconds. The task will consist of a screen with 48 sliders. Each slider is initially positioned at 0 and can be moved as far as 100. Each slider has a number to its right showing its current position. You can use the mouse in any way you like to move each slider. You can readjust the position of each slider as many times as you wish. Your “points score” in the task will be the number of sliders positioned at exactly 50 at the end of the 120 seconds. Are there any questions?

In each paying round, there will be a prize which you may win. Each prize will be chosen randomly at the beginning of the round and will be between £0.10 and £3.90. Whether you will win the prize depends on the difference between your points score and a given number, and some element of chance. The given number will change each round. If your points score is equal to this given number, you will have a 50% chance of winning the prize. If your points score differs from this given number, your chance of winning increases by 1 percentage point for every increase of 1 in the difference between your points scores and the given number, while your chance of winning correspondingly decreases by 1 percentage point for every decrease of 1 between your points score and the given number. The table at the end of these instructions gives the chance of winning for any difference between your points score and a given number. Please look at this table now. **[Look at table]** Are there any questions?

During each task, a number of pieces of information will appear at the top of your screen, including the time remaining, the round number, the prize for the round, the given number and your points score in the task so far.

After you have completed the task, you will see a summary screen showing your points score, the given number, your probability of winning, the prize for the round and whether you won the prize or not in the round.

We will now start the first of the two practice rounds. Before we start, are there any questions?

Please look at your screen now. **[First practice round]** Before we start the second practice round, are there any questions? Please look at your screen now. **[Second practice round]** Are there any questions?

The practice rounds are finished. We will now start the 10 paying rounds. There will be no pauses between the rounds. Before we start the paying rounds, are there any remaining questions? There will be no further opportunities to ask questions. Please look at your screen now. **[10 paying rounds]**

The session is now complete. Your total cash payment, including the show up fee, is displayed on your screen. Please leave the room one by one when asked to do so to receive your payment. Remember to bring the envelope containing your four digit Participant ID number with you but please leave all other materials on your desk. Thank you for participating.

Difference in your points score and the given number	Chance of winning prize if your points score is higher than the given number	Chance of winning prize if your points score is lower than the given number
0	50%	50%
1	51%	49%
2	52%	48%
3	53%	47%
4	54%	46%
5	55%	45%
6	56%	44%
7	57%	43%
8	58%	42%
9	59%	41%
10	60%	40%
11	61%	39%
12	62%	38%
13	63%	37%
14	64%	36%
15	65%	35%
16	66%	34%
17	67%	33%
18	68%	32%
19	69%	31%
20	70%	30%
21	71%	29%
22	72%	28%
23	73%	27%
24	74%	26%
25	75%	25%
26	76%	24%
27	77%	23%
28	78%	22%
29	79%	21%
30	80%	20%
31	81%	19%
32	82%	18%
33	83%	17%
34	84%	16%
35	85%	15%
36	86%	14%
37	87%	13%
38	88%	12%
39	89%	11%
40	90%	10%
41	91%	9%
42	92%	8%
43	93%	7%
44	94%	6%
45	95%	5%
46	96%	4%
47	97%	3%
48	98%	2%
49	Not Possible as there are only 48 sliders	
50	Not possible as there are only 48 sliders	

Appendix B. Observed Moments

Observed moment	GP	SOCIA	ASOCI	SOCIA	ASOCI	SOCIA	ASOCI
		L1	AL1	L2	AL2	L3	AL3
SD($e_{2,n,r}$)	5.875	4.713	4.065	4.944	5.260	4.935	5.675
Corr($e_{2,n,r}, e_{2,n,r-1}$)	0.652	0.778	0.542	0.652	0.826	0.607	0.792
Corr($e_{2,n,r}, e_{2,n,r-2}$)	0.596	0.727	0.608	0.692	0.801	0.544	0.733
SD($e_{2,n,r} - e_{2,n,r-1}$)	4.828	3.075	3.879	4.057	3.062	4.292	3.630
Mean($e_{2,n,1}$)	21.763	23.133	22.966	23.183	24.983	22.407	22.950
Mean($e_{2,n,2}$)	23.458	24.033	23.627	23.683	25.068	24.119	24.133
Mean($e_{2,n,3}$)	24.831	25.000	24.424	24.600	26.119	24.678	24.217
Mean($e_{2,n,4}$)	25.203	25.067	25.153	25.350	26.051	26.186	25.150
Mean($e_{2,n,5}$)	25.119	25.400	25.509	26.033	26.848	26.136	26.200
Mean($e_{2,n,6}$)	24.898	25.667	25.932	26.417	26.729	26.966	26.683
Mean($e_{2,n,7}$)	25.763	26.267	25.932	26.483	27.915	27.712	26.750
Mean($e_{2,n,8}$)	26.170	26.900	26.831	27.033	27.848	26.949	27.230
Mean($e_{2,n,9}$)	26.254	27.317	26.458	27.500	27.390	27.254	27.233
Mean($e_{2,n,10}$)	26.729	27.533	27.170	27.783	28.475	28.237	27.083
Corr($e_{2,n,r}, v_{n,r} e_{1,n,r}, e_{1,n,r} v_{n,r}, RD, FE$)	0.124	0.043	-0.021	0.019	0.029	-0.067	-0.034
Corr($e_{2,n,r}, e_{1,n,r} v_{n,r}, e_{1,n,r} v_{n,r}, RD, FE$)	0.042	0.021	-0.081	0.005	0.031	-0.066	-0.010
Corr($e_{2,n,r}, e_{1,n,r} v_{n,r} e_{1,n,r}, v_{n,r}, RD, FE$)	-0.095	-0.038	0.037	-0.010	-0.013	0.085	0.040
Pc ₁₇ Corr _n ($e_{2,n,r}, v_{n,r} e_{1,n,r}, e_{1,n,r} v_{n,r}, RT$)	-0.275	-0.329	-0.314	-0.410	-0.275	-0.314	-0.224
Pc ₃₃ Corr _n ($e_{2,n,r}, v_{n,r} e_{1,n,r}, e_{1,n,r} v_{n,r}, RT$)	0.033	-0.029	-0.079	-0.174	-0.076	-0.042	-0.012
Pc ₅₀ Corr _n ($e_{2,n,r}, v_{n,r} e_{1,n,r}, e_{1,n,r} v_{n,r}, RT$)	0.222	0.094	0.103	-0.031	0.047	0.206	0.080
Pc ₆₆ Corr _n ($e_{2,n,r}, v_{n,r} e_{1,n,r}, e_{1,n,r} v_{n,r}, RT$)	0.388	0.218	0.215	0.205	0.203	0.322	0.218
Pc ₈₃ Corr _n ($e_{2,n,r}, v_{n,r} e_{1,n,r}, e_{1,n,r} v_{n,r}, RT$)	0.469	0.458	0.436	0.473	0.468	0.471	0.408
Pc ₁₇ Corr _n ($e_{2,n,r}, e_{1,n,r} v_{n,r}, e_{1,n,r} v_{n,r}, RT$)	-0.328	-0.296	-0.445	-0.321	-0.326	-0.480	-0.357
Pc ₃₃ Corr _n ($e_{2,n,r}, e_{1,n,r} v_{n,r}, e_{1,n,r} v_{n,r}, RT$)	-0.218	-0.171	-0.277	-0.149	-0.074	-0.275	-0.153
Pc ₅₀ Corr _n ($e_{2,n,r}, e_{1,n,r} v_{n,r}, e_{1,n,r} v_{n,r}, RT$)	0.019	-0.052	-0.119	-0.014	0.068	-0.034	-0.014
Pc ₆₆ Corr _n ($e_{2,n,r}, e_{1,n,r} v_{n,r}, e_{1,n,r} v_{n,r}, RT$)	0.179	0.096	0.101	0.186	0.180	0.131	0.261
Pc ₈₃ Corr _n ($e_{2,n,r}, e_{1,n,r} v_{n,r}, e_{1,n,r} v_{n,r}, RT$)	0.361	0.301	0.372	0.366	0.388	0.337	0.467
Pc ₁₇ Corr _n ($e_{2,n,r}, e_{1,n,r} v_{n,r} e_{1,n,r}, v_{n,r}, RT$)	-0.194	-0.317	-0.330	-0.456	-0.280	-0.310	-0.175
Pc ₃₃ Corr _n ($e_{2,n,r}, e_{1,n,r} v_{n,r} e_{1,n,r}, v_{n,r}, RT$)	0.019	-0.121	-0.082	-0.189	-0.092	-0.032	-0.090
Pc ₅₀ Corr _n ($e_{2,n,r}, e_{1,n,r} v_{n,r} e_{1,n,r}, v_{n,r}, RT$)	0.146	0.074	0.145	-0.034	0.051	0.151	0.073
Pc ₆₆ Corr _n ($e_{2,n,r}, e_{1,n,r} v_{n,r} e_{1,n,r}, v_{n,r}, RT$)	0.298	0.232	0.229	0.178	0.209	0.320	0.229
Pc ₈₃ Corr _n ($e_{2,n,r}, e_{1,n,r} v_{n,r} e_{1,n,r}, v_{n,r}, RT$)	0.474	0.395	0.446	0.441	0.446	0.505	0.426
Mean($e_{2,n,r} e_{1,n,r} < 23 \cap v_{n,r} < 1.33$)	23.821	25.8999	25.662	25.219	26.394	25.925	25.566
Mean($e_{2,n,r} e_{1,n,r} < 23 \cap v_{n,r} > 2.55$)	25.485	25.515	25.349	25.247	26.850	24.964	25.554
Mean($e_{2,n,r} e_{1,n,r} > 28 \cap v_{n,r} < 1.33$)	25.836	25.367	24.881	26.745	26.820	26.916	25.458
Mean($e_{2,n,r} e_{1,n,r} > 28 \cap v_{n,r} > 2.55$)	25.050	26.410	25.494	26.224	26.823	26.916	26.764
Prop($e_{2,n,r} < 15$)	0.029	0.023	0.014	0.012	0.009	0.014	0.025
Prop($e_{2,n,r} > 35$)	0.015	0.008	0.002	0.012	0.049	0.034	0.033

Notes: Subjects who failed to position any sliders correctly in any round are excluded from the analysis and four sliders are added to each effort score in SOCIAL1 and ASOCIAL1 (see text for discussion). Corr($x, y | z$) denotes the correlation between variables x and y after partialing out linear additive effects of control variables z . Partialing out is accomplished by working with the residuals from regressions of the dependent variables on the control variables, and RD, FE, and RT denote round dummies, Second Mover specific fixed effects and a linear round trend respectively. Pc_jCorr_n($x, y | z$) is the j^{th} percentile of the Second Mover specific correlation between variables x and y after partialing out linear additive effects of control variables z .