

Habits vs. Goals: latest results

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version **2.1**

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1 Task and background

1.1 Subjects

Initial total number of subjects: 27. From the initial 27 subjects, the following were excluded:

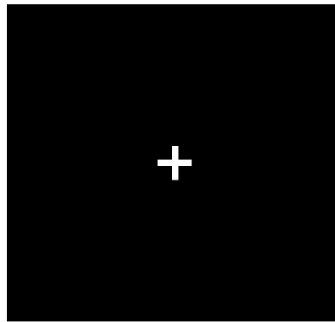
- subject 2: problem with behavioral data
- subject 9: learning rate is zero
- subject 10: learning rate is zero
- subject 21: experiment interrupted (no data)
- subject 26: experiment interrupted (no data)

Subjects 2, 21 and 26 were excluded from all analyses. Subjects 9 and 10 were included only in group-level behavioral plots, but not in the regressions.

1.2 Task description

Each subject completed 5 sessions of 60 choice trials each.

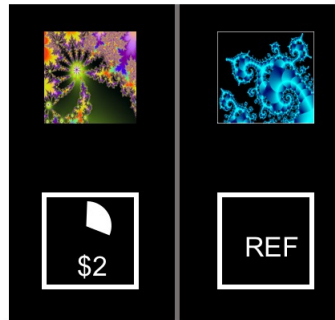
Each trial begins with a central fixation (random ITI between 4 and 7 seconds).



In each trial, the subject has to choose between two pairs, one on the left and one on the right. Each pair contains a fractal (at the top) and a gamble (at the bottom).



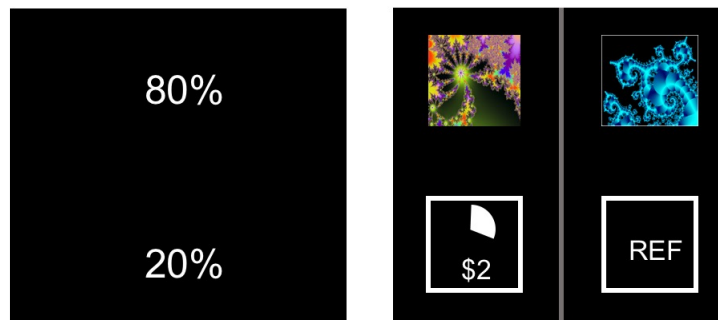
There are only 2 fractals in the whole experiment. Each fractal is associated with a different probability of a fixed payout of \$1. These probabilities are not shown on the screen, and they drift slowly throughout the experiment (random walk between $p = 0.25$ and $p = 0.75$, with $\sigma = 0.025$).



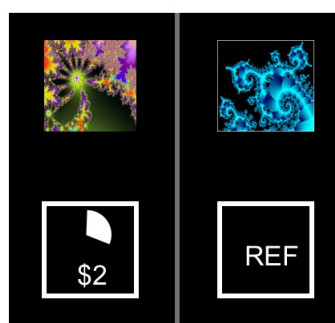
The gamble on the left changes from trial to trial. The gamble on the right is the reference gamble (same in every trial): a 50% probability of winning \$1.



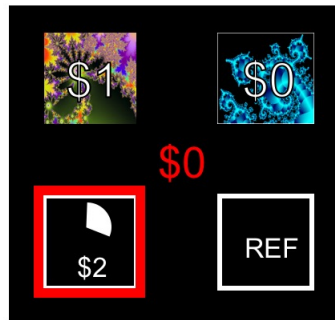
Before each choice, the subject sees the probabilities associated with a fractal draw or a gable draw (screen is shown for 2 seconds). The number at the top corresponds to the probability that the reward for the trial will be drawn from the fractals, while the number at the bottom corresponds to the probability that the reward will be drawn from the gambles.



The subject has a maximum of 4 seconds to respond in each trial. Trials with no response recorded do not accumulate towards the final payout. In trials where the subject takes less than 4 seconds to respond, the remaining time gets added to the following ITI.



After each trial, the computer draws the lottery associated with the option chosen: for instance, if the subject chose left, a reward will be drawn from the left gamble with probability p , and from the left fractal with probability $(1-p)$. The subject sees a **red box** around the selected option (fractal or gamble) as well as the resulting reward drawn for that trial in the center of the screen in **red** (reward screen is shown for 3 seconds).



In addition, the subject sees the reward drawn from each fractal in that trial. Only the amount shown in red in the center of the screen actually counts as the reward for that trial.



1.3 Variable definitions

EV_{left} and EV_{right} correspond to the expected values of the left and right gambles, respectively. Q_{left} and Q_{right} correspond to the Q values estimated for the left and right fractals, respectively (the Q-learning model was fitted separately for each subject).

The left and right total weighted values are defined as $V_{left} = P_{gamble} \times EV_{left} + (1 - P_{gamble}) \times Q_{left}$ and $V_{right} = P_{gamble} \times EV_{right} + (1 - P_{gamble}) \times Q_{right}$, respectively.

The total weighted value difference is given by $V_{left} - V_{right}$, which is equivalent to $P_{gamble}(EV_{left} - EV_{right}) + (1 - P_{gamble})(Q_{left} - Q_{right})$.

Correct choice trials are defined as those where the subject chose the option (left or right) with the largest value, or when both options had the same value (in which case the trial is considered correct regardless of the subject's choice).

Congruent trials are those where $(EV_{left} - EV_{right}) \times (Q_{left} - Q_{right}) > 0$, i.e., the choice for both the fractals and the gambles corresponds to the same side. In contrast, incongruent trials are those where $(EV_{left} - EV_{right}) \times (Q_{left} - Q_{right}) < 0$.

2 Choice analyses

2.1 Fitting the Q-learning model

Learning rates are fitted per subject as follows. We perform a grid search for the parameter α (learning rate) over the range 0 to 1 (with a step of size 0.05). For each potential value of α , we obtain the Q values for the two choice options (left and right) at each trial t , $Q(t, L)$ and $Q(t, R)$, using the model:

$$Q(1, L) = 0$$

$$Q(1, R) = 0$$

$$Q(t, L) = Q(t - 1, L) + \alpha(R(t - 1, L) - Q(t - 1, L))$$

$$Q(t, R) = Q(t - 1, R) + \alpha(R(t - 1, R) - Q(t - 1, R))$$

where $R(t - 1, L)$ and $R(t - 1, R)$ are the rewards shown for the left and right fractals, respectively, at trial $t - 1$.

We then use a softmax decision rule to compute the likelihood for each trial, given the Q values and the choices made by the subject, with a temperature value of $T = 1$. Finally, we select the value for α associated with the minimum negative log likelihood, computed over all trials.

Table 1: Learning rate fitted per subject

subject	learning rate
1	0.15
3	0.05
4	0.15
5	0.45
6	0.25
7	0.35
8	0.15
9	0
10	0
11	0.20
12	0.05
13	0.30
14	0.35
15	0.25
16	0.25
17	0.05
18	0.10
19	0.60
20	0.30
22	0.15
23	0.30
24	0.05
25	0.35
27	0.35
mean:	0.217
sd:	0.152

2.2 Verifying the quality of learning

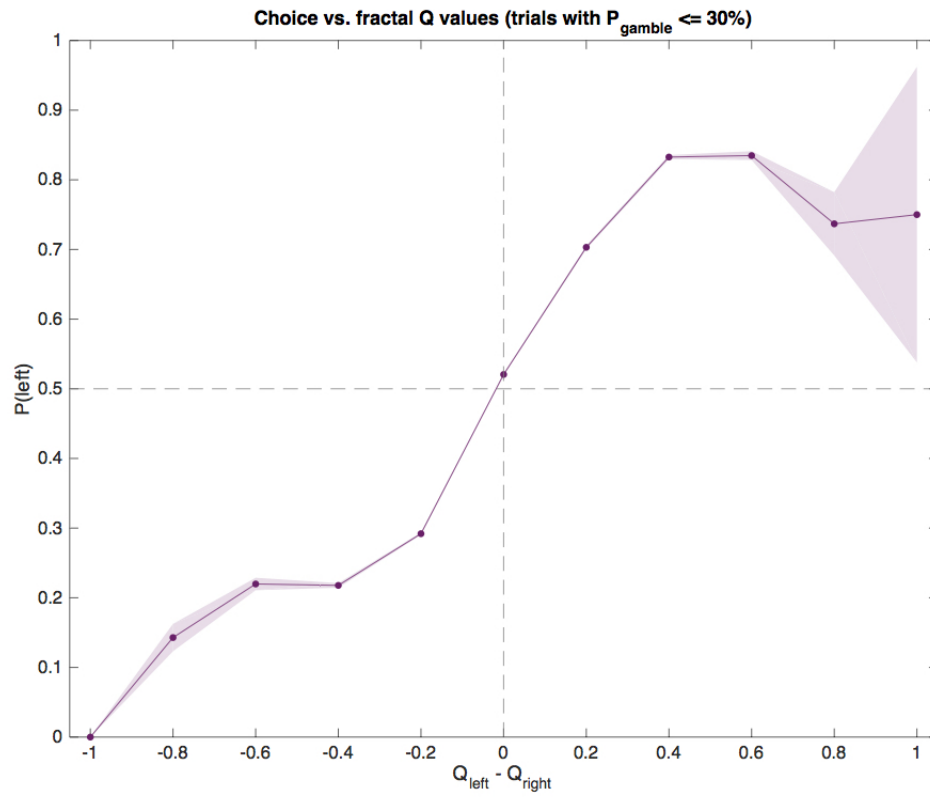


Table 2: Individual choice logits: prob. choose left vs. Q value difference, for trials where $P_{gamble} \leq 30\%$. choice \sim qDiff.

subject	constant	t-stat	qDiff	t-stat
1	0.56	2.26	5.68	4.66
3	-0.54	-1.69	4.66	2.28
4	-0.27	-1.04	6.30	4.80
5	0.55	2.51	1.44	2.37
6	-0.07	-0.32	3.19	4.38
7	0.52	2.15	4.42	4.44
8	-0.36	-1.15	8.96	5.41
11	0.37	1.56	3.96	4.58
12	0.29	1.34	2.51	1.71
13	-0.62	-2.68	2.97	3.88
14	0.12	0.54	1.38	2.02
15	-0.24	-1.03	3.97	4.68
16	0.51	2.26	2.82	3.64
17	0.48	1.44	9.55	3.94
18	-0.06	-0.21	6.27	4.41
19	0.20	0.87	2.66	4.71
20	0.45	1.94	4.07	4.46
22	-0.08	-0.39	2.58	3.27
23	-0.25	-1.15	2.44	3.30
24	-0.33	-1.42	5.42	3.74
25	1.09	4.73	1.37	1.77
27	-0.15	-0.68	2.08	3.35
mean:	0.10		4.03	
sd:	0.44		2.26	

2.3 Choice vs. total weighted value difference

$$\text{totWeightedValDiff} = P_{gamble} \times (EV_{left} - EV_{right}) + (1 - P_{gamble}) \times (Q_{left} - Q_{right}).$$

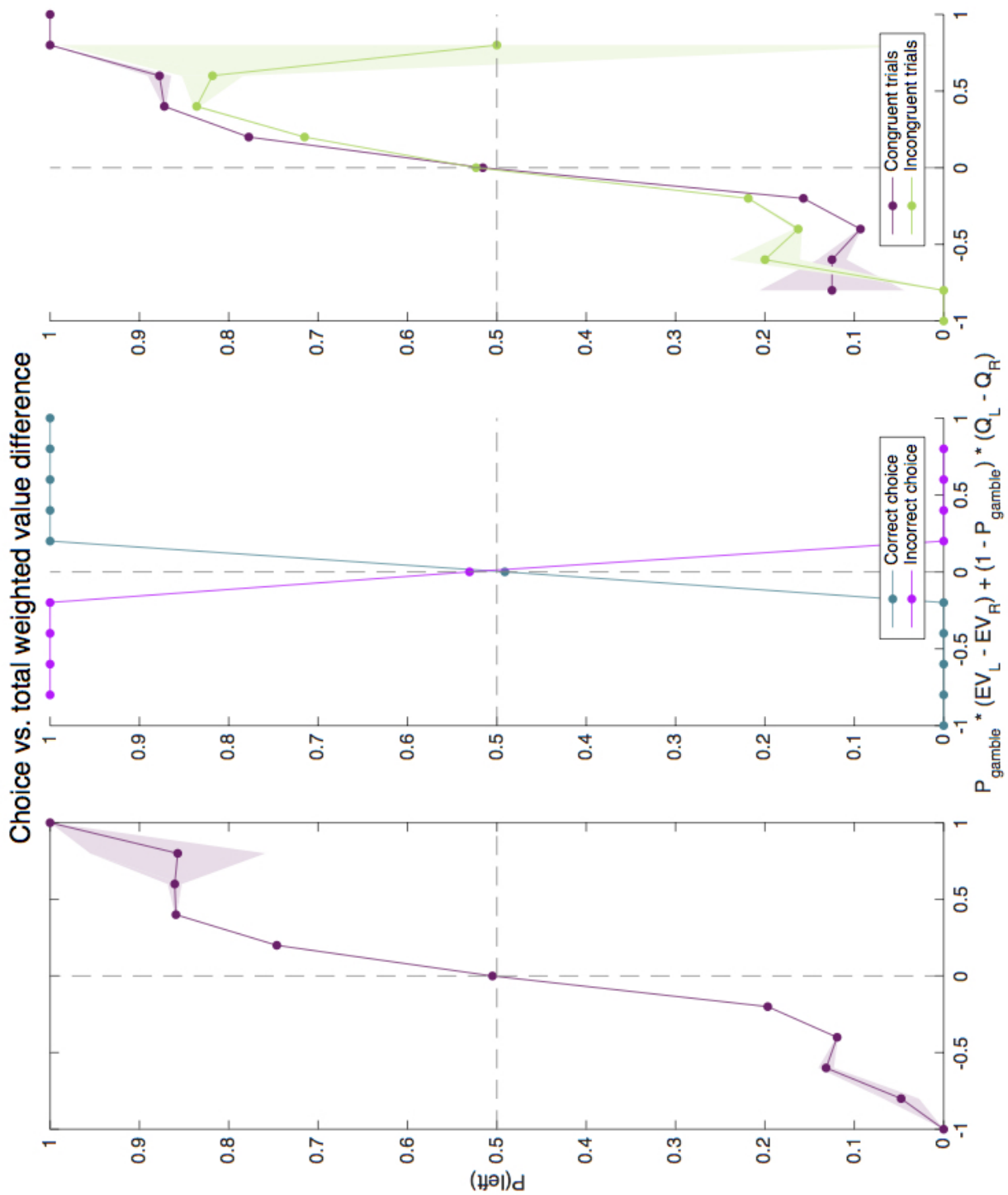


Table 3: Individual choice logits: prob. choose left vs. total weighted value difference. choice \sim totWeightedValDiff.

subject	constant	t-stat	totWeightedValDiff	t-stat
1	0.47	3.30	6.19	7.89
3	-0.38	-2.46	9.23	8.22
4	-0.71	-4.44	7.56	8.50
5	0.03	0.24	4.24	7.36
6	-0.07	-0.50	6.40	8.65
7	0.12	0.87	4.17	6.75
8	-0.71	-4.19	9.14	8.96
11	-0.12	-0.83	6.03	8.38
12	0.53	3.74	7.59	7.80
13	-0.47	-3.32	5.77	7.92
14	0.04	0.35	2.72	5.11
15	-0.55	-3.72	6.16	8.05
16	-0.10	-0.75	4.33	7.07
17	-0.06	-0.44	5.71	6.99
18	-0.38	-2.37	9.39	8.65
19	-0.19	-1.48	3.75	7.15
20	0.27	1.78	6.98	8.71
22	-0.39	-2.66	6.64	8.31
23	-0.28	-2.10	3.99	6.49
24	-0.48	-3.37	6.49	7.53
25	0.79	5.23	6.09	7.91
27	0.17	1.18	5.73	8.37
mean:	-0.11		6.10	
sd:	0.40		1.79	

2.4 Aggregate analyses: choice logits grouped by probability of fractal/gamble draw

$$\text{evDiff} = EV_{\text{left}} - EV_{\text{right}}.$$

$$\text{qDiff} = Q_{\text{left}} - Q_{\text{right}}.$$

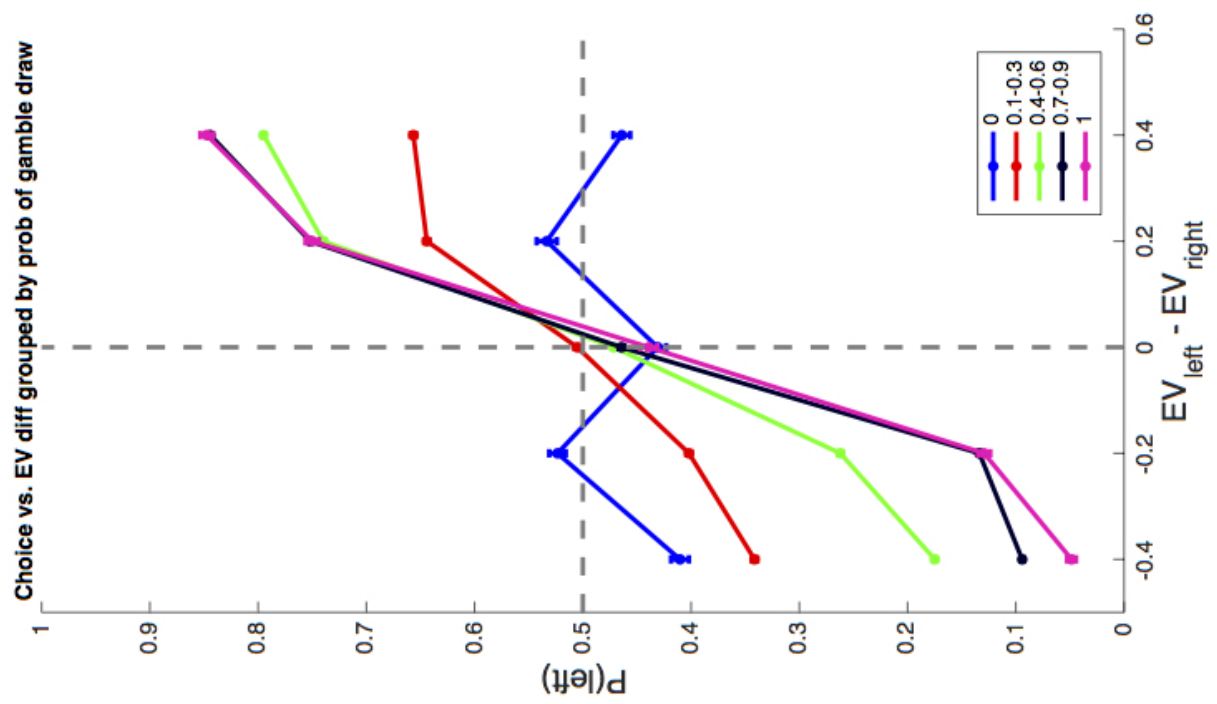
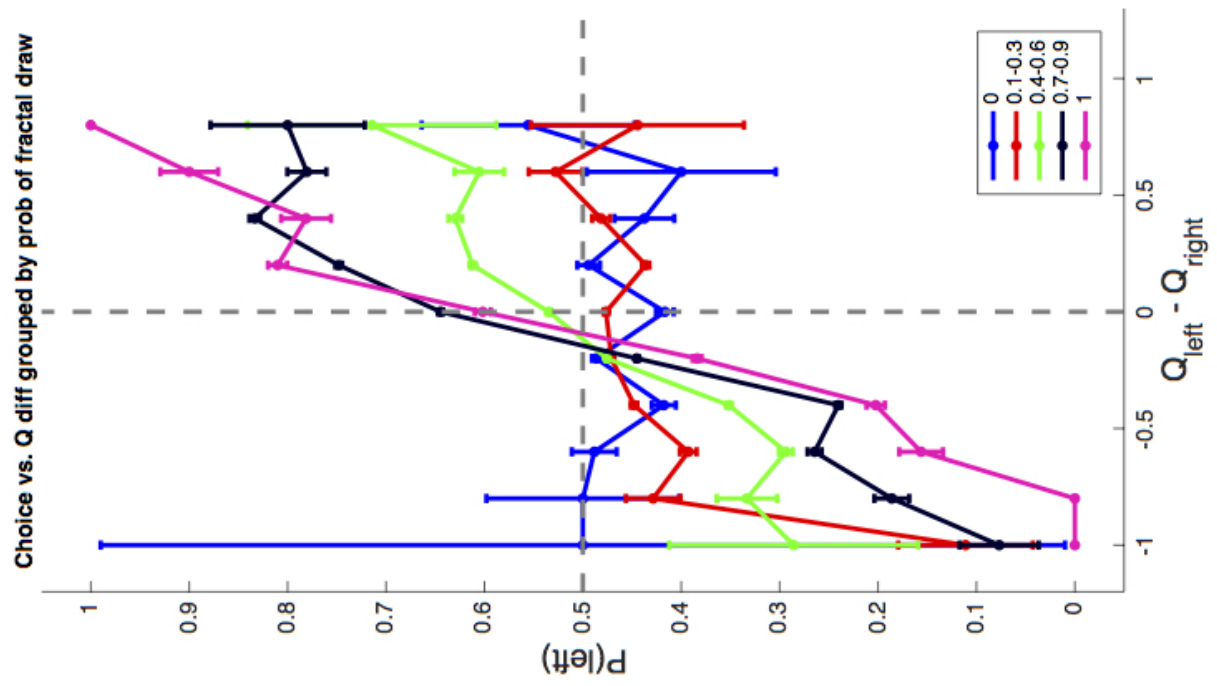


Table 4: Aggregate choice logits grouped by probability of gamble draw: fixed effects. choice $\sim 1 + \text{evDiff} + \text{qDiff} + (1 + \text{evDiff} + \text{qDiff} \mid \text{subject})$.

prob gamble draw	constant	SE	evDiff	SE	qDiff	SE
0	-0.1441	0.1489	0.3261	0.3748	4.7168	0.5576
0.1-0.3	0.14590	0.09437	2.34550	0.32673	3.84278	0.45200
0.4-0.6	-0.09935	0.09726	4.81326	0.43450	1.98470	0.21267
0.7-0.9	-0.3479	0.1400	6.7956	0.6390	0.3678	0.2292
1	-0.5299	0.1588	6.7521	0.5978	-0.1354	0.4238

2.5 Conflict

$$\text{evDiff} = EV_{\text{left}} - EV_{\text{right}}.$$

$$\text{qDiff} = Q_{\text{left}} - Q_{\text{right}}.$$

conflict is 1 if $\text{evDiff} \times \text{qDiff} < 0$, and 0 otherwise. agree is 1 if $\text{evDiff} \times \text{qDiff} > 0$, and 0 otherwise.

$$\text{wRelEV} = P_{\text{gamble}} \times (EV_{\text{left}} - EV_{\text{right}}). \text{ wRelQ} = (1 - P_{\text{gamble}}) \times (Q_{\text{left}} - Q_{\text{right}}).$$

$$\text{awRelEV} = \text{agree} \times P_{\text{gamble}} \times (EV_{\text{left}} - EV_{\text{right}}). \text{ cwRelEV} = \text{conflict} \times P_{\text{gamble}} \times (EV_{\text{left}} - EV_{\text{right}}).$$

$$\text{awRelQ} = \text{agree} \times (1 - P_{\text{gamble}}) \times (Q_{\text{left}} - Q_{\text{right}}). \text{ cwRelQ} = \text{conflict} \times (1 - P_{\text{gamble}}) \times (Q_{\text{left}} - Q_{\text{right}}).$$

$$\text{conflictSize} = \text{abs}(\text{cwRelEV}) + \text{abs}(\text{cwRelQ}).$$

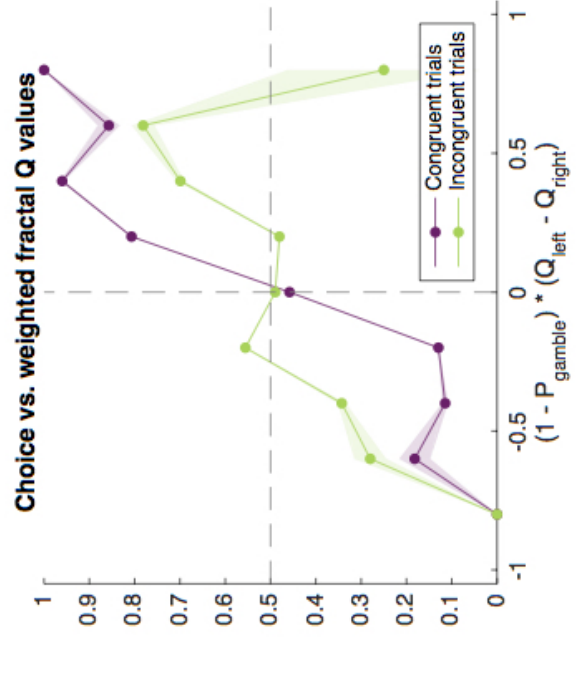
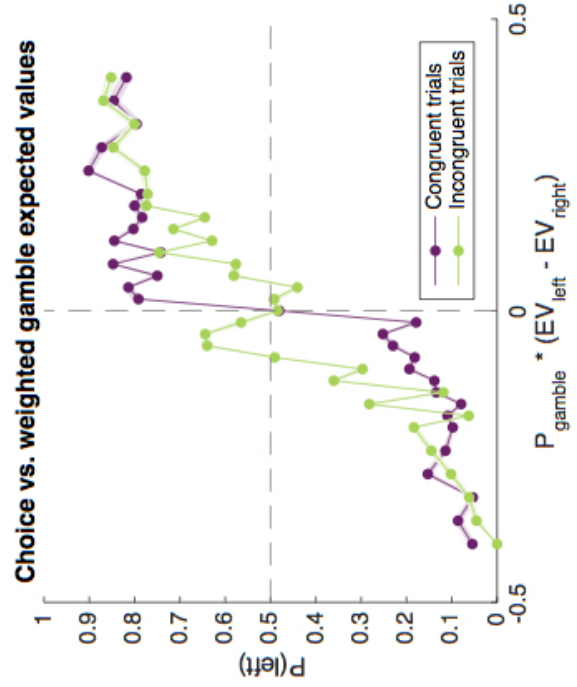
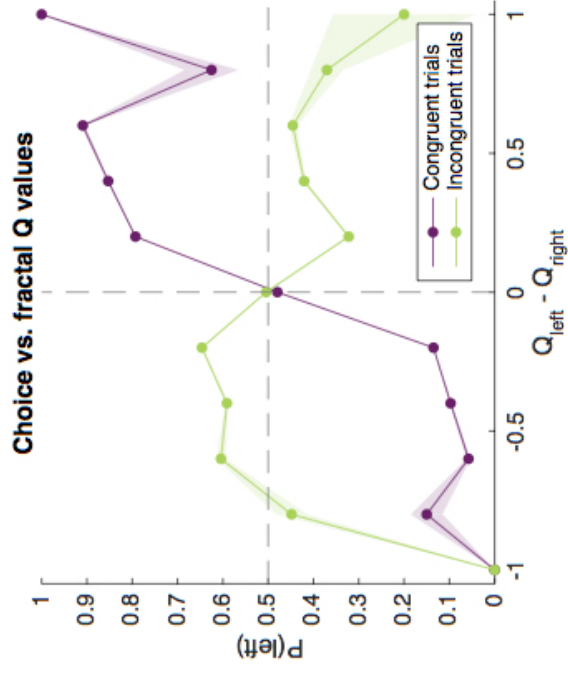
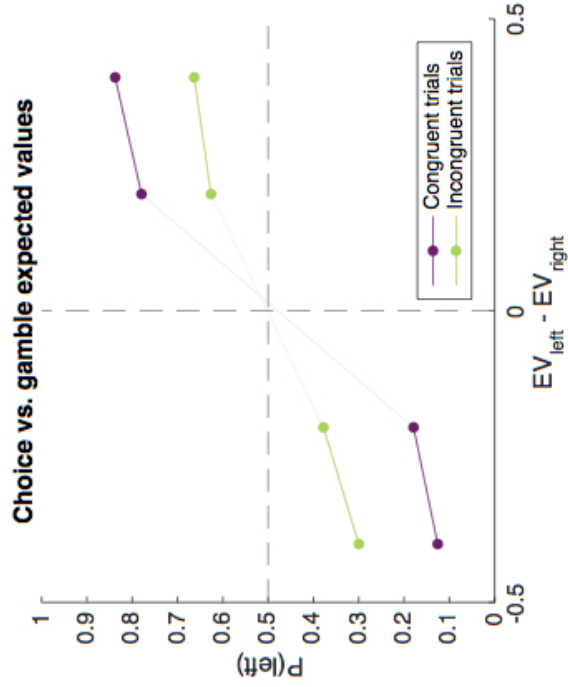


Table 5: choice \sim wRelEV + cwRelEV + wRelQ + cwRelQ + c.

subj	cons	t-stat	wRelEV	t-stat	cwRelEV	t-stat	wRelQ	t-stat	cwRelQ	t-stat	c	t-stat
1	0.64	3.30	4.99	3.73	-0.53	-1.72	7.01	4.13	6.05	2.43	-2.62	-1.10
3	-0.78	-2.89	10.10	3.50	0.13	0.29	9.03	2.70	-0.82	-0.23	-8.15	-1.89
4	-0.65	-3.00	5.70	3.81	-0.11	-0.33	8.19	4.78	3.26	1.40	0.51	0.18
5	0.18	0.97	9.05	4.94	0.01	0.04	1.76	2.14	1.83	0.63	1.43	1.00
6	0.12	0.53	12.88	4.33	-0.55	-1.64	5.94	3.97	-2.76	-0.76	-5.56	-2.88
7	0.05	0.26	3.36	2.55	0.26	0.91	4.73	4.13	1.68	0.86	-1.03	-0.57
8	-1.07	-4.21	7.07	3.81	0.75	2.10	10.70	4.94	4.08	1.45	-0.49	-0.16
11	-0.19	-0.97	4.89	3.36	0.23	0.78	9.16	4.87	4.52	1.81	-5.91	-2.68
12	1.03	4.78	12.14	4.74	-0.55	-1.63	-1.95	-0.83	-0.93	-0.28	8.40	2.39
13	-0.97	-4.47	8.42	4.81	0.85	2.59	4.84	3.68	4.35	1.42	-0.77	-0.40
14	-0.21	-1.28	3.15	2.57	0.56	2.14	3.21	3.18	-0.95	-0.55	-3.12	-2.01
15	-0.63	-2.86	9.37	4.56	0.11	0.37	6.76	4.01	-3.06	-1.18	-4.00	-2.00
16	-0.26	-1.41	5.30	3.61	0.27	1.01	5.25	3.87	-0.00	-0.00	-4.11	-2.39
17	0.10	0.40	3.44	2.35	-0.00	-0.01	11.91	3.96	1.69	0.80	-4.88	-1.25
18	-0.58	-2.43	14.57	4.29	0.32	0.90	8.45	3.52	-6.88	-1.82	-3.32	-1.07
19	-0.13	-0.79	2.88	2.44	-0.13	-0.49	3.17	3.99	3.55	1.91	2.18	1.46
20	0.53	2.68	8.27	4.52	-0.16	-0.41	5.15	3.80	15.42	2.85	1.71	0.74
22	-0.50	-2.44	8.44	4.55	0.22	0.70	6.40	4.01	4.30	1.40	-4.13	-2.02
23	-0.62	-3.29	4.58	3.54	0.86	3.06	6.07	3.85	-0.81	-0.44	-4.83	-2.59
24	-0.54	-2.69	6.66	4.14	0.19	0.63	6.71	3.15	0.01	0.00	-2.12	-0.71
25	1.03	4.48	12.69	5.35	-0.07	-0.19	2.82	2.52	2.70	0.70	0.08	0.04
27	0.26	1.17	12.37	4.78	-0.57	-1.68	4.91	3.97	-1.24	-0.37	-3.39	-2.12
mean:	-0.15		7.74		0.09		5.92		1.63		-2.01	
sd:	0.59		3.58		0.43		3.10		4.36		3.56	

Table 6: Aggregate choice logits: fixed effects. $\text{choice} \sim 1 + \text{awRelEV} + \text{cwRelEV} + \text{awRelQ} + \text{cwRelQ} + (1 + \text{awRelEV} + \text{cwRelEV} + \text{awRelQ} + \text{cwRelQ} \mid \text{subject})$.

variable	estimate	SE	z value
constant	-0.11630	0.09601	-1.211
awRelEV	7.15810	0.67236	10.646
cwRelEV	8.96728	0.79157	11.328
awRelQ	5.59825	0.56343	9.936
cwRelQ	3.49611	0.48191	7.255

Table 7: Aggregate choice logits with conflict size: fixed effects. $\text{choice} \sim 1 + \text{awRelEV} + \text{cwRelEV} + \text{awRelQ} + \text{cwRelQ} + (\text{conflictSize} \times \text{cwRelEV}) + (\text{conflictSize} \times \text{cwRelQ}) + (1 + \text{awRelEV} + \text{cwRelEV} + \text{awRelQ} + \text{cwRelQ} + (\text{conflictSize} \times \text{cwRelEV}) + (\text{conflictSize} \times \text{cwRelQ}) \mid \text{subject})$.

variable	estimate	SE	z value
constant	-0.1389	0.1137	-1.222
awRelEV	7.2439	0.6811	10.636
cwRelEV	12.8563	1.6278	7.898
awRelQ	5.6856	0.5689	9.994
cwRelQ	5.1006	1.2215	4.176
conflictSize	0.1182	0.3182	0.371
conflictSize \times cwRelEV	-13.1517	4.0674	-3.233
conflictSize \times cwRelQ	-4.6665	2.5333	-1.842

Table 8: Aggregate choice logits when $P_{\text{gamble}} < 0.5$: fixed effects. $\text{choice} \sim 1 + \text{awRelEV} + \text{cwRelEV} + \text{awRelQ} + \text{cwRelQ} + (1 + \text{awRelEV} + \text{cwRelEV} + \text{awRelQ} + \text{cwRelQ} \mid \text{subject})$.

variable	estimate	SE	z value
constant	0.07847	0.09368	0.838
awRelEV	9.97056	1.64980	6.043
cwRelEV	8.28170	1.45330	5.699
awRelQ	5.64415	0.62882	8.976
cwRelQ	3.75666	0.52301	7.183

Table 9: Aggregate choice logits when $P_{\text{gamble}} > 0.5$: fixed effects. $\text{choice} \sim 1 + \text{awRelEV} + \text{cwRelEV} + \text{awRelQ} + \text{cwRelQ} + (1 + \text{awRelEV} + \text{cwRelEV} + \text{awRelQ} + \text{cwRelQ} \mid \text{subject})$.

variable	estimate	SE	z value
constant	-0.3335	0.1238	-2.693
awRelEV	7.2994	0.7205	10.130
cwRelEV	8.1883	0.7087	11.553
awRelQ	4.8203	1.1575	4.164
cwRelQ	0.6359	1.5106	0.421

Table 10: Aggregate choice logits when $P_{gamble} \leq 0.3$: fixed effects. choice $\sim 1 + \text{awRelEV} + \text{cwRelEV} + \text{awRelQ} + \text{cwRelQ} + (1 + \text{awRelEV} + \text{cwRelEV} + \text{awRelQ} + \text{cwRelQ} \mid \text{subject})$.

variable	estimate	SE	z value
constant	0.01739	0.10520	0.165
awRelEV	15.65597	4.15922	3.764
cwRelEV	7.88407	2.85294	2.763
awRelQ	5.03384	0.61229	8.221
cwRelQ	3.61844	0.54481	6.642

Table 11: Aggregate choice logits when $0.3 < P_{gamble} \leq 0.7$: fixed effects. choice $\sim 1 + \text{awRelEV} + \text{cwRelEV} + \text{awRelQ} + \text{cwRelQ} + (1 + \text{awRelEV} + \text{cwRelEV} + \text{awRelQ} + \text{cwRelQ} \mid \text{subject})$.

variable	estimate	SE	z value
constant	-0.04287	0.10281	-0.417
awRelEV	7.77834	0.88899	8.750
cwRelEV	10.42109	1.28226	8.127
awRelQ	5.69254	0.67802	8.396
cwRelQ	4.35703	0.95466	4.564

Table 12: Aggregate choice logits when $P_{gamble} > 0.7$: fixed effects. choice $\sim 1 + \text{awRelEV} + \text{cwRelEV} + \text{awRelQ} + \text{cwRelQ} + (1 + \text{awRelEV} + \text{cwRelEV} + \text{awRelQ} + \text{cwRelQ} \mid \text{subject})$.

variable	estimate	SE	z value
constant	-0.5076	0.1400	-3.625
awRelEV	6.7432	0.6748	9.993
cwRelEV	7.4651	0.6056	12.326
awRelQ	6.4976	2.9290	2.218
cwRelQ	-5.7967	5.6273	-1.030

3 RT analyses

3.1 RT vs. total weighted value difference

$$\text{totWeightedValDiff} = P_{gamble} \times (EV_{left} - EV_{right}) + (1 - P_{gamble}) \times (Q_{left} - Q_{right}).$$

RT vs. total weighted value difference

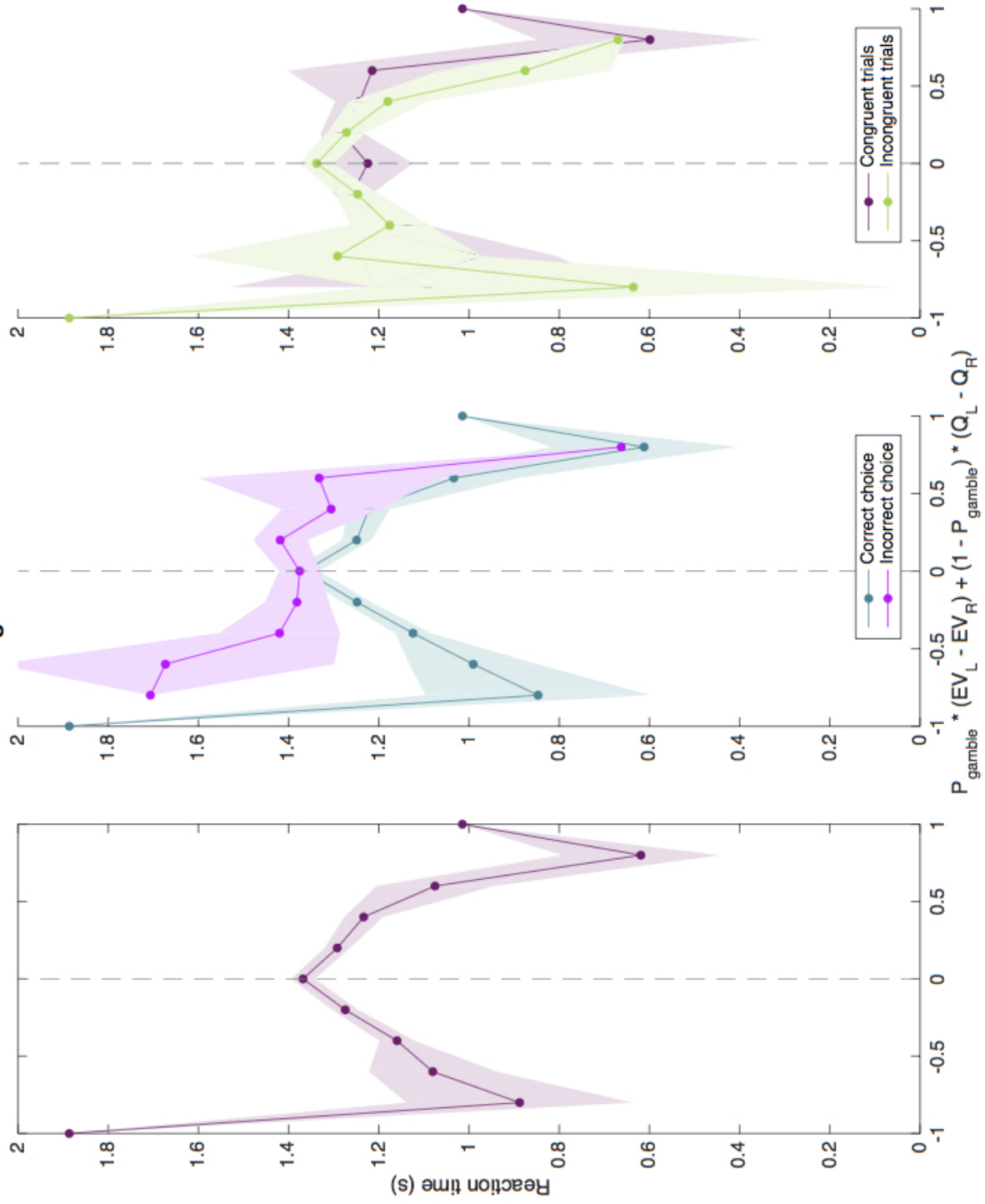


Table 13: Individual RT vs. difficulty. $RT \sim \text{abs}(\text{totWeightedValDiff})$.

subject	constant	t-stat	difficulty	t-stat
1	1.14	30.09	0.67	3.90
3	1.28	27.18	0.37	1.53
4	1.38	27.44	0.79	3.51
5	1.64	25.76	0.77	3.40
6	1.12	38.24	0.48	4.39
7	1.65	21.79	0.63	2.11
8	1.73	28.67	0.96	3.89
11	2.09	29.95	0.58	2.13
12	0.97	42.19	0.43	3.44
13	1.67	27.60	0.82	3.65
14	1.43	20.57	0.80	2.87
15	1.24	39.45	0.52	4.45
16	1.13	29.72	0.54	3.43
17	0.75	29.06	0.18	1.40
18	1.52	22.70	0.93	3.05
19	1.35	35.79	0.42	3.45
20	1.75	39.51	0.48	2.83
22	1.57	25.16	0.98	3.72
23	1.32	20.59	0.56	2.23
24	1.30	24.08	1.05	3.78
25	1.59	24.62	0.83	3.16
27	1.21	29.71	0.43	3.05
mean:	1.40		0.65	
sd:	0.30		0.23	

3.2 Aggregate analyses: RT grouped by probability of fractal/gamble draw

$$\text{evDiff} = EV_{\text{left}} - EV_{\text{right}}.$$

$$\text{qDiff} = Q_{\text{left}} - Q_{\text{right}}.$$

Table 14: Aggregate RT grouped by probability of gamble draw: fixed effects. $RT \sim 1 + \text{abs}(\text{evDiff}) + \text{abs}(\text{qDiff}) + (1 + \text{abs}(\text{evDiff}) + \text{abs}(\text{qDiff}) \mid \text{subject})$.

prob gamble draw	constant	SE	abs(evDiff)	SE	abs(qDiff)	SE
0	1.05835	0.07466	0.07351	0.15934	-0.52183	0.12569
0.1-0.3	1.39051	0.07953	-0.20035	0.09759	-0.21598	0.07379
0.4-0.6	1.48702	0.06894	-0.35871	0.08300	-0.13356	0.08417
0.7-0.9	1.38634	0.05953	-0.47044	0.07863	0.03521	0.06662
1	1.23910	0.06361	-0.38982	0.13944	0.09735	0.10667

3.3 Conflict

$$\text{evDiff} = EV_{\text{left}} - EV_{\text{right}}.$$

$$\text{qDiff} = Q_{\text{left}} - Q_{\text{right}}.$$

conflict is 1 if $\text{evDiff} \times \text{qDiff} < 0$, and 0 otherwise. agree is 1 if $\text{evDiff} \times \text{qDiff} > 0$, and 0 otherwise.

$$\text{wRelEV} = P_{\text{gamble}} \times (EV_{\text{left}} - EV_{\text{right}}). \text{ wRelQ} = (1 - P_{\text{gamble}}) \times (Q_{\text{left}} - Q_{\text{right}}).$$

$$\text{awRelEV} = \text{agree} \times P_{\text{gamble}} \times (EV_{\text{left}} - EV_{\text{right}}). \text{ cwRelEV} = \text{conflict} \times P_{\text{gamble}} \times (EV_{\text{left}} - EV_{\text{right}}).$$

$$\text{awRelQ} = \text{agree} \times (1 - P_{\text{gamble}}) \times (Q_{\text{left}} - Q_{\text{right}}). \text{ cwRelQ} = \text{conflict} \times (1 - P_{\text{gamble}}) \times (Q_{\text{left}} - Q_{\text{right}}).$$

$$\text{conflictSize} = \text{abs}(\text{cwRelEV}) + \text{abs}(\text{cwRelQ}).$$

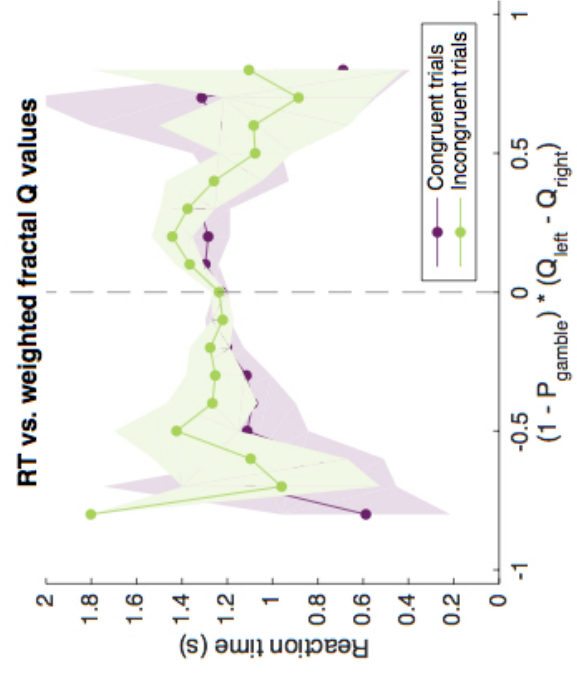
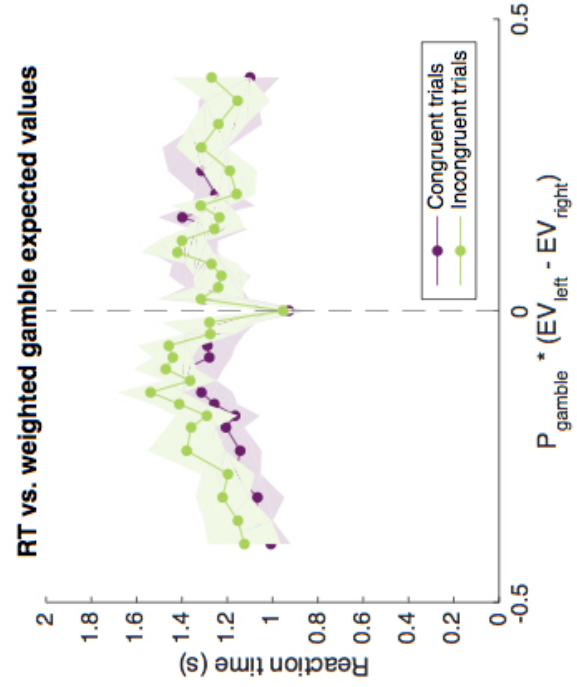
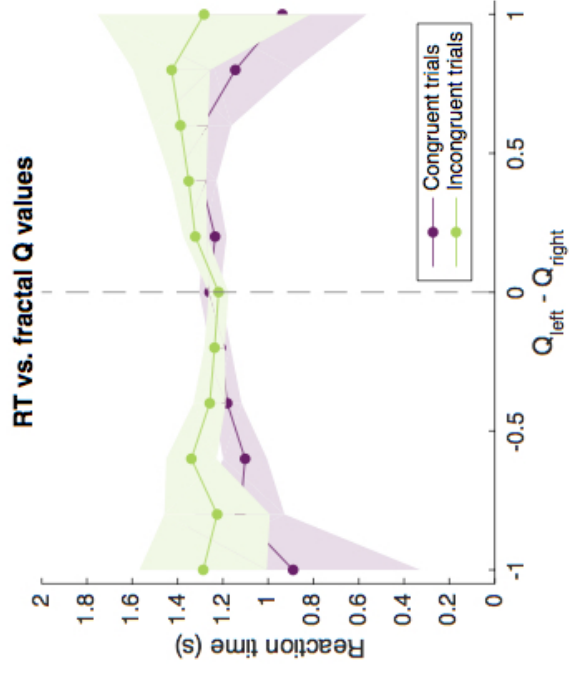
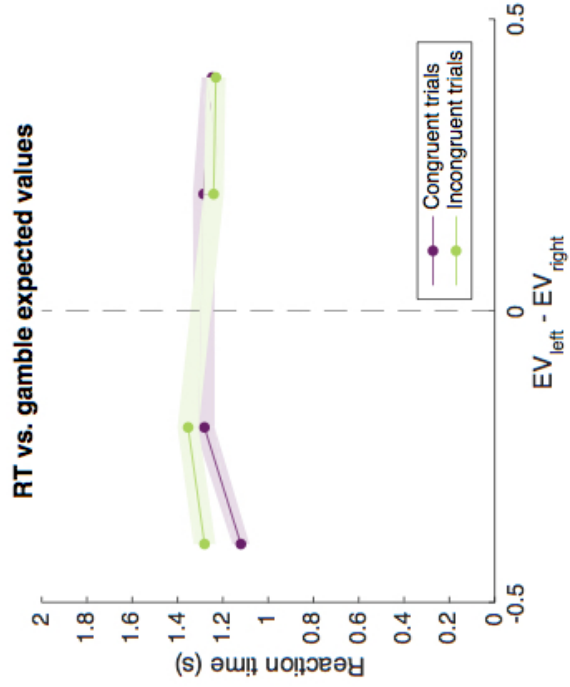


Table 15: $RT \sim \text{abs(wRelEV)} + \text{abs(cwRelEV)} + \text{abs(wRelQ)} + \text{abs(cwRelQ)} + c$.

subj	cons	t-stat	abs(wRelEV)	t-stat	abs(cwRelEV)	t-stat	abs(wRelQ)	t-stat	abs(cwRelQ)	t-stat	c	t-stat
1	1.17	22.53	-0.44	-1.78	-0.15	-1.48	-1.27	-4.37	0.68	1.50	1.06	2.35
3	1.30	19.01	-0.35	-1.10	-0.09	-0.68	-0.95	-1.86	0.57	1.03	1.18	1.33
4	1.39	20.70	-0.27	-0.78	-0.38	-2.60	-1.23	-3.70	1.07	1.82	2.25	3.40
5	1.74	19.64	-0.91	-2.12	-0.53	-3.10	-1.05	-3.64	2.48	3.22	1.19	2.24
6	1.14	27.57	-0.46	-2.21	-0.11	-1.32	-0.61	-3.91	0.42	1.22	0.67	2.26
7	1.68	16.41	-0.88	-1.70	-0.12	-0.58	-0.42	-1.00	0.23	0.26	0.46	0.65
8	1.67	19.54	-0.96	-2.22	-0.13	-0.81	-0.71	-1.98	1.40	2.01	0.71	1.10
11	2.03	21.87	-0.98	-2.19	-0.04	-0.24	0.13	0.33	1.63	2.00	-0.64	-0.99
12	0.95	27.97	-0.44	-2.68	-0.08	-1.19	-0.31	-0.98	0.62	2.19	0.64	1.26
13	1.66	19.04	-0.64	-1.51	0.04	0.22	-0.77	-2.46	0.12	0.16	0.12	0.23
14	1.52	15.42	-0.93	-1.83	-0.40	-2.10	-1.32	-3.49	1.86	2.13	1.70	2.51
15	1.23	27.23	-0.53	-2.48	-0.10	-1.13	-0.50	-3.07	0.93	2.26	0.42	1.57
16	1.14	21.44	-0.55	-2.22	-0.03	-0.35	-0.45	-1.84	0.29	0.70	0.03	0.09
17	0.81	24.89	0.10	0.61	-0.12	-1.96	-1.08	-4.85	0.41	1.43	0.39	1.09
18	1.59	17.95	-0.97	-2.16	-0.44	-2.36	-1.77	-3.62	1.72	2.23	3.03	3.42
19	1.30	23.52	0.23	0.80	0.05	0.49	-0.41	-2.59	-0.41	-0.87	0.06	0.22
20	1.76	29.06	-0.48	-1.64	-0.00	-0.03	-0.41	-1.72	-0.34	-0.63	0.39	1.02
22	1.57	17.97	-0.91	-2.08	0.11	0.69	-0.80	-1.92	-0.24	-0.34	-0.65	-0.98
23	1.32	15.54	-0.49	-1.13	-0.24	-1.40	-0.56	-1.52	0.98	1.18	0.90	1.65
24	1.32	17.13	-1.03	-2.70	0.11	0.84	-1.37	-2.24	-0.43	-0.70	0.33	0.37
25	1.65	17.22	-1.16	-2.49	-0.13	-0.77	-0.53	-1.37	0.38	0.49	0.34	0.53
27	1.36	23.55	-1.12	-3.93	-0.32	-2.86	-0.79	-4.17	1.13	2.33	1.07	3.47
mean:	1.42		-0.64		-0.14		-0.78		0.71		0.71	
sd:	0.29		0.38		0.18		0.44		0.78		0.85	

Table 16: Aggregate RT: fixed effects. $RT \sim 1 + \text{abs}(\text{awRelEV}) + \text{abs}(\text{cwRelEV}) + \text{abs}(\text{awRelQ}) + \text{abs}(\text{cwRelQ}) + (1 + \text{abs}(\text{awRelEV}) + \text{abs}(\text{cwRelEV}) + \text{abs}(\text{awRelQ}) + \text{abs}(\text{cwRelQ}) \mid \text{subject})$.

variable	estimate	SE	t value
constant	1.38468	0.06241	22.187
abs(awRelEV)	-0.51652	0.08608	-6.001
abs(cwRelEV)	-0.29556	0.09561	-3.091
abs(awRelQ)	-0.63187	0.07132	-8.860
abs(cwRelQ)	-0.36244	0.07022	-5.161

Table 17: Aggregate RT with conflict size: fixed effects. $RT \sim 1 + \text{abs}(\text{awRelEV}) + \text{abs}(\text{cwRelEV}) + \text{abs}(\text{awRelQ}) + \text{abs}(\text{cwRelQ}) + (\text{conflictSize} \times \text{abs}(\text{cwRelEV})) + (\text{conflictSize} \times \text{abs}(\text{cwRelQ})) + (1 + \text{abs}(\text{awRelEV}) + \text{abs}(\text{cwRelEV}) + \text{abs}(\text{awRelQ}) + \text{abs}(\text{cwRelQ}) + (\text{conflictSize} \times \text{abs}(\text{cwRelEV})) + (\text{conflictSize} \times \text{abs}(\text{cwRelQ})) \mid \text{subject})$.

variable	estimate	SE	t value
constant	0.47146	0.03501	13.468
abs(awRelEV)	-0.12432	0.11390	-1.091
abs(cwRelEV)	0.12513	0.37079	0.337
abs(awRelQ)	-0.02955	0.15147	-0.195
abs(cwRelQ)	0.50587	0.23140	2.186
conflictSize \times abs(cwRelEV)	-0.35241	0.80778	-0.436
conflictSize \times abs(cwRelQ)	-0.87246	0.36533	-2.388

Table 18: Aggregate RT when $P_{\text{gamble}} < 0.5$: fixed effects. $RT \sim 1 + \text{abs}(\text{awRelEV}) + \text{abs}(\text{cwRelEV}) + \text{abs}(\text{awRelQ}) + \text{abs}(\text{cwRelQ}) + (1 + \text{abs}(\text{awRelEV}) + \text{abs}(\text{cwRelEV}) + \text{abs}(\text{awRelQ}) + \text{abs}(\text{cwRelQ}) \mid \text{subject})$.

variable	estimate	SE	t value
constant	0.51720	0.03302	15.665
abs(awRelEV)	-0.21806	0.25598	-0.852
abs(cwRelEV)	0.26601	0.27132	0.980
abs(awRelQ)	-0.15866	0.15782	-1.005
abs(cwRelQ)	-0.07185	0.13922	-0.516

Table 19: Aggregate RT when $P_{\text{gamble}} > 0.5$: fixed effects. $RT \sim 1 + \text{abs}(\text{awRelEV}) + \text{abs}(\text{cwRelEV}) + \text{abs}(\text{awRelQ}) + \text{abs}(\text{cwRelQ}) + (1 + \text{abs}(\text{awRelEV}) + \text{abs}(\text{cwRelEV}) + \text{abs}(\text{awRelQ}) + \text{abs}(\text{cwRelQ}) \mid \text{subject})$.

variable	estimate	SE	t value
constant	0.44206	0.03800	11.632
abs(awRelEV)	-0.04214	0.12794	-0.329
abs(cwRelEV)	0.10798	0.14473	0.746
abs(awRelQ)	0.03297	0.29612	0.111
abs(cwRelQ)	-0.08033	0.30254	-0.266

Table 20: Aggregate RT when $P_{gamble} \leq 0.3$: fixed effects. $RT \sim 1 + \text{abs}(\text{awRelEV}) + \text{abs}(\text{cwRelEV}) + \text{abs}(\text{awRelQ}) + \text{abs}(\text{cwRelQ}) + (1 + \text{abs}(\text{awRelEV}) + \text{abs}(\text{cwRelEV}) + \text{abs}(\text{awRelQ}) + \text{abs}(\text{cwRelQ}) \mid \text{subject})$.

variable	estimate	SE	t value
constant	0.482049	0.042003	11.477
abs(awRelEV)	0.168017	0.615677	0.273
abs(cwRelEV)	0.676703	0.681595	0.993
abs(awRelQ)	-0.064855	0.169355	-0.383
abs(cwRelQ)	0.000449	0.160398	0.003

Table 21: Aggregate RT when $0.3 < P_{gamble} \leq 0.7$: fixed effects. $RT \sim 1 + \text{abs}(\text{awRelEV}) + \text{abs}(\text{cwRelEV}) + \text{abs}(\text{awRelQ}) + \text{abs}(\text{cwRelQ}) + (1 + \text{abs}(\text{awRelEV}) + \text{abs}(\text{cwRelEV}) + \text{abs}(\text{awRelQ}) + \text{abs}(\text{cwRelQ}) \mid \text{subject})$.

variable	estimate	SE	t value
constant	0.50914	0.03741	13.610
abs(awRelEV)	-0.18214	0.13935	-1.307
abs(cwRelEV)	-0.07779	0.21544	-0.361
abs(awRelQ)	-0.18228	0.19230	-0.948
abs(cwRelQ)	0.10922	0.13841	0.789

Table 22: Aggregate RT when $P_{gamble} > 0.7$: fixed effects. $RT \sim 1 + \text{abs}(\text{awRelEV}) + \text{abs}(\text{cwRelEV}) + \text{abs}(\text{awRelQ}) + \text{abs}(\text{cwRelQ}) + (1 + \text{abs}(\text{awRelEV}) + \text{abs}(\text{cwRelEV}) + \text{abs}(\text{awRelQ}) + \text{abs}(\text{cwRelQ}) \mid \text{subject})$.

variable	estimate	SE	t value
constant	0.43014	0.04085	10.531
abs(awRelEV)	-0.02949	0.13480	-0.219
abs(cwRelEV)	0.21024	0.15594	1.348
abs(awRelQ)	-0.04126	0.58299	-0.071
abs(cwRelQ)	-1.14287	0.62336	-1.833

4 Individual differences

To be done.