

Chimpanzees engage in competitive altruism in a triadic Ultimatum Game

Luke Maurits <luke_maurits@eva.mpg.de>

2023-01-31

Pre-registered models of total proportional offer

M1: Proportional total offer, dyadic vs triadic

Posterior predictive distribution for total proportional offers in 8th session

	Posterior mean	95% HPD lower	95% HPD upper
Dyadic	0.38	0.02	0.88
Triadic	0.34	0.03	0.80

Posterior predictive distribution for difference in total proportional offers in 8th session

Posterior mean	95% HPD lower	95% HPD upper
-0.04	-0.65	0.58

M2: Proportional total offer, consecutive vs simultaneous

Posterior predictive distribution for total proportional offers in 8th triadic session

	Posterior mean	95% HPD lower	95% HPD upper
Simultaneous	0.30	0.01	0.81
Consecutive	0.34	0.01	0.86

Posterior probability that mean consecutive offer is higher than mean simultaneous offer:

[1] 0.829

Posterior predictive distribution for difference in offer between conditions:

Posterior mean	95% HPD lower	95% HPD upper
0.04	-0.62	0.68

Models of tendency for final offers to exceed initial offers within sessions

Marginalised over session probabilities of increasing within a session

	Posterior mean	95% HPD lower	95% HPD upper
Dyadic	0.36	0.21	0.52
Triadic	0.60	0.39	0.79

Per-session probabilities

Dyadic

Session	Posterior mean	95% HPD lower	95% HPD upper
1	0.32	0.17	0.50
2	0.33	0.18	0.49
3	0.33	0.19	0.48
4	0.33	0.21	0.47
5	0.34	0.22	0.46
6	0.34	0.23	0.46
7	0.35	0.24	0.47
8	0.35	0.24	0.47
9	0.36	0.25	0.48
10	0.36	0.25	0.49
11	0.37	0.25	0.50
12	0.37	0.25	0.51
13	0.38	0.24	0.53
14	0.39	0.23	0.55
15	0.39	0.22	0.57
16	0.40	0.21	0.59

Triadic

Session	Posterior mean	95% HPD lower	95% HPD upper
1	0.51	0.30	0.71
2	0.52	0.33	0.71
3	0.53	0.35	0.71
4	0.54	0.38	0.71
5	0.56	0.40	0.71
6	0.57	0.41	0.72
7	0.58	0.43	0.73
8	0.60	0.44	0.74
9	0.61	0.46	0.75
10	0.62	0.46	0.76
11	0.63	0.47	0.78
12	0.64	0.48	0.79
13	0.65	0.48	0.81
14	0.66	0.48	0.82
15	0.67	0.47	0.84
16	0.68	0.47	0.86

Per session contrast in probabilities (triadic - dyadic)

Session	Posterior mean	95% HPD lower	95% HPD upper
1	0.18	-0.09	0.45
2	0.19	-0.06	0.44
3	0.20	-0.03	0.43
4	0.21	-0.01	0.42
5	0.22	0.01	0.41
6	0.23	0.03	0.41
7	0.23	0.05	0.42
8	0.24	0.06	0.42
9	0.25	0.06	0.43
10	0.26	0.06	0.44
11	0.26	0.06	0.46
12	0.27	0.06	0.47
13	0.27	0.04	0.49
14	0.28	0.03	0.50
15	0.28	0.02	0.52
16	0.29	0.00	0.54

Models of tendency to increase offers from trial to trial

Relative to self

Marginalised over sessions

	Posterior mean	95% HPD lower	95% HPD upper
Previous offer accepted	0.28	0.19	0.39
Previous offer rejected	0.52	0.39	0.64

Accepted vs rejected contrast

Posterior mean	95% HPD lower	95% HPD upper
0.23	0.12	0.34

Relative to previous trial winner

Marginalised over sessions

	Posterior mean	95% HPD lower	95% HPD upper
Previous offer accepted	0.45	0.29	0.60
Previous offer rejected	0.35	0.22	0.49

Accepted vs rejected contrast

Posterior mean	95% HPD lower	95% HPD upper
-0.1	-0.21	0.01

Models of tendency of second proposers to outbid first proposers

Without accounting for value of first offer

Posterior probability that second proposer becomes more likely to outbid first proposer as sessions increase

[1] 0.88525

Probability that second proposer offers more than first proposer in consecutive trials, marginalising over sessions

Posterior mean	95% HPD lower	95% HPD upper
0.45	0.26	0.66

Per session probabilities that second proposer offers more than first proposer in consecutive trials

Session	Posterior mean	95% HPD lower	95% HPD upper
1	0.39	0.21	0.60
2	0.40	0.22	0.60
3	0.40	0.23	0.60
4	0.41	0.24	0.61
5	0.42	0.25	0.61
6	0.43	0.26	0.62
7	0.44	0.27	0.63
8	0.45	0.28	0.63
9	0.46	0.29	0.65
10	0.47	0.29	0.65
11	0.48	0.30	0.66
12	0.49	0.31	0.67
13	0.50	0.32	0.68
14	0.51	0.32	0.69
15	0.51	0.32	0.71
16	0.52	0.32	0.72

Stratifying by first offer

Outbidding probabilities in first session, stratified by first offer

First Offer	Baseline outbidding rate	Posterior mean	95% HPD lower	95% HPD upper	PP rate above chance	PP rate above baseline
0	0.80	0.70	0.48	0.87	0.97	0.15
1	0.65	0.55	0.32	0.75	0.67	0.18
2	0.54	0.40	0.21	0.62	0.17	0.09
3	0.38	0.35	0.17	0.55	0.07	0.39
4	0.24	0.28	0.12	0.48	0.02	0.63
5	0.13	0.08	0.01	0.21	0.00	0.13
6	0.08	0.04	0.00	0.11	0.00	0.09
7	0.02	0.02	0.00	0.08	0.00	0.43
8	0.00	0.01	0.00	0.05	0.00	1.00

Outbidding probabilities in final session, stratified by first offer

First Offer	Baseline outbidding rate	Posterior mean	95% HPD lower	95% HPD upper	PP rate above chance	PP rate above baseline
0	0.80	0.84	0.68	0.95	1.00	0.76
1	0.65	0.74	0.53	0.89	0.98	0.84
2	0.54	0.61	0.39	0.79	0.87	0.77
3	0.38	0.56	0.35	0.75	0.74	0.96
4	0.24	0.48	0.26	0.69	0.44	0.98
5	0.13	0.16	0.03	0.39	0.00	0.54
6	0.08	0.08	0.01	0.24	0.00	0.43
7	0.02	0.05	0.00	0.18	0.00	0.76
8	0.00	0.03	0.00	0.12	0.00	1.00

Difference in outbidding probability between initial offers of 4 and 5

Posterior mean	95% HPD lower	95% HPD upper
0.32	0.09	0.53