

Supplemental Material: Reciprocity supports cooperation in real-world collective action networks

Sample Characteristics

The clubs in our data set are samples from WEIRD (Apicella, Norenzayan, and Henrich 2020; Henrich 2020; Henrich, Heine, and Norenzayan 2010) countries: 2 from Australia, 1 from Canada and the rest from the United States. One software provider gave us access to their whole catalog of groups, which included the 3 from outside of the United States, and the other only gave us access to their clubs located in New England. The sample includes defunct and still functioning clubs (as of the end of the data period), where the average lifespan of defunct clubs was 3.16 years (2.16 SD) and 28.7 orders (21.3 SD), while the censored average lifespan for continuing clubs is 3.24 years (1.38SD) and 46.9 orders (27.9 SD). The average number of members participating in an order is 7.96 for defunct clubs (6.96 SD) and 12.7 for ongoing (9.41 SD). Additionally, the average number of co-purchased items in each order is 3.29 for defunct clubs (4.82 SD) and 11.2 for ongoing clubs (28.9 SD).

References

- Apicella, Coren, Ara Norenzayan, and Joseph Henrich. 2020. "Beyond WEIRD: A Review of the Last Decade and a Look Ahead to the Global Laboratory of the Future." *Evolution and Human Behavior* 41: 319–29. <https://doi.org/10.1016/j.evolhumbehav.2020.07.015>.
- Henrich, Joseph. 2020. *The WEIRDest People in the World: How the West Became Psychologically Peculiar and Particularly Prosperous*. Farrar, Straus; Giroux.
- Henrich, Joseph, Steven J. Heine, and Ara Norenzayan. 2010. "The Weirdest People in the World?" 33: 61-83; discussion 83-135. <https://doi.org/10.1017/S0140525X0999152X>.

Table 1: Share-based Reciprocal Edge Classifications and Coefficients of Variation

Club	Orders	Members	Percent of Total Edges				Coefficient of Variation			
			DWR	DBR	IWR	IBR	DWR	DBR	IWR	IBR
1	59	23	70.87	11.97	3.28	2.80	28.77	78.05	120.88	147.78
2	11	10	64.71	0.00	5.88	0.00	73.43		331.66	
3	22	28	67.22	7.53	5.51	5.33	19.21	91.81	87.29	112.77
4	27	18	61.61	7.59	6.70	6.47	68.37	154.02	137.39	172.58
5	69	9	57.27	14.98	2.64	5.73	63.31	147.32	281.49	242.32
6	15	4	63.06	14.41	4.50	6.31	81.21	146.99	273.94	230.75
7	93	8	63.72	15.93	1.77	6.64	79.24	150.72	450.82	271.84
8	64	66	54.21	15.11	10.31	4.17	43.17	109.03	93.08	172.86
9	48	26	45.65	11.68	10.05	7.07	59.34	152.03	132.13	216.36
10	91	122	57.66	11.87	9.91	4.06	13.53	40.11	39.79	86.51
11	67	31	58.35	12.01	6.84	4.10	43.81	91.61	109.77	135.80
12	10	27	71.52	11.17	6.59	2.49	9.65	37.65	28.08	56.07
13	69	51	58.29	14.67	6.88	4.90	27.74	55.13	56.51	96.41
14	80	46	55.42	17.70	7.50	4.70	33.05	75.29	102.94	103.74
15	80	144	52.23	10.25	11.01	6.93	24.58	51.12	52.48	58.61
16	76	78	57.64	13.33	8.57	4.06	22.30	49.65	58.45	92.28
17	30	9	55.06	22.12	4.24	4.24	41.59	59.62	160.40	175.02
18	46	6	55.56	6.35	2.38	6.35	62.84	173.14	368.19	227.58
19	20	3	67.92	15.09	0.00	5.66	83.63	183.90		324.63
20	14	9	57.76	20.05	3.10	2.86	21.63	49.64	136.29	138.62
21	52	66	61.26	15.35	6.88	2.87	12.20	35.95	48.67	63.86
22	95	66	66.18	14.14	5.39	1.16	23.07	51.71	55.79	393.82
23	100	141	73.70	7.93	5.85	1.64	22.59	52.21	72.25	296.70
24	34	45	63.69	8.09	8.91	1.86	6.35	37.19	23.71	75.64
25	30	80	64.49	6.05	9.31	1.58	8.67	37.68	24.51	88.82
26	5	7	54.17	4.17	6.25	6.25	40.61	142.88	100.33	189.81
27	34	7	71.70	7.55	1.26	6.92	52.25	198.15	329.63	245.41
28	17	23	61.07	14.18	6.08	7.09	20.82	54.33	99.73	98.16
29	67	34	61.24	19.19	4.86	3.76	19.04	49.68	77.84	94.82
30	17	4	66.67	0.00	0.00	9.52	55.08			209.44
31	44	7	36.36	33.77	5.19	15.58	112.18	102.91	277.17	158.48
32	37	7	60.13	6.54	3.92	3.27	70.79	168.90	215.30	270.34
33	5	11	47.04	0.00	14.88	1.12	7.86		25.75	124.32
34	6	6	61.29	8.76	3.92	0.00	16.16	89.78	78.31	
35	62	16	44.50	3.46	11.01	0.71	19.25	90.96	61.45	296.87
Totals										
	1596	1238	59.69	11.51	6.04	4.52	39.64	94.04	136.73	171.79

Table 2: Purchase Order-based Reciprocal Edge Classifications

Club Number	Percent of Total Edges			
	DWR	DBR	IWR	IBR
1	23.8	40.8	8.6	15.3
5	15.4	28.4	7.1	29.0
7	8.3	27.4	5.4	8.9
8	15.7	35.0	19.8	13.6
18	18.9	21.1	10.5	44.2
19	11.4	51.4	2.9	28.6
20	29.9	38.2	5.1	10.7
22	43.4	25.4	9.7	13.0
27	24.1	38.9	2.8	27.8
29	28.8	29.7	10.5	14.6
30	0.0	14.3	21.4	64.3
31	6.2	56.2	3.1	28.1
32	17.4	20.9	9.6	35.7
Means	18.7	32.9	9.0	25.7

Table 3: Mixed Effects Models

	<i>Dependent variable:</i>		
	All Edges	Out Degree Singular Assistance Edges	Robustness Check
	(1)	(2)	(3)
Global Mean Intercept	25.936*** (9.869)	4.006*** (1.199)	80.588 (60.302)
In Degree	0.882*** (0.009)	0.457*** (0.011)	0.635*** (0.026)
Random Effects:			
Standard Deviation	36.36	6.71	169.67
Clubs	35	35	13
Observations	1530	1113	263
REML	21098.26	8248.94	3949.23
AIC	21106.26	8256.94	3957.23

Note:

*p<0.1; **p<0.05; ***p<0.01

Table 4: SPR Cluster Centers

Club	Beneficiary	Reciprocator	Helper
1	-0.880	0	0.836
2	-0.742	0	0.783
3	-0.977	0	0.868
4	-1.160	0	0.905
5	-1.033	0	0.706
6	-0.805	0	0.766
7	-0.730	0	0.864
8	-1.033	0	1.037
9	-1.053	0	0.956
10	-1.403	0	0.816
11	-1.059	0	0.948
12	-1.707	0	0.467
13	-1.125	0	0.904
14	-1.062	0	0.873
15	-1.180	0	0.904
16	-1.083	0	0.871
17	-0.888	0	0.878
18	-0.904	0	0.761
19	-0.573	0	0.678
20	-0.970	0	0.707
21	-1.063	0	0.695
22	-0.885	0	0.745
23	-1.527	0	0.537
24	-0.999	0	0.688
25	-1.633	0	0.586
26	-0.981	0	0.798
27	-0.621	0	0.733
28	-0.922	0	0.731
29	-0.952	0	0.864
30	-1.134	0	0.505
31	-0.952	0	0.747
32	-0.920	0	0.709
33	-1.969	0	0.663
34	-0.761	0	0.847
35	-1.527	0	1.007

Table 5: Count of Member Types

Club	Beneficiaries	Reciprocators	Helpers	Unclassified*
1	0	21	2	4
2	2	8	0	2
3	3	22	3	7
4	1	14	3	9
5	1	7	1	1
6	1	3	0	10
7	2	6	0	4
8	7	49	10	11
9	3	19	4	6
10	9	87	26	25
11	3	22	6	6
12	3	19	5	3
13	3	35	13	13
14	5	31	10	10
15	16	97	31	46
16	13	52	13	11
17	1	6	2	3
18	1	4	1	11
19	0	2	1	5
20	1	6	2	1
21	11	43	12	2
22	5	47	14	6
23	10	85	46	41
24	5	27	13	6
25	3	48	29	16
26	1	4	2	3
27	0	4	3	2
28	5	13	5	6
29	3	19	12	5
30	0	2	2	1
31	1	3	3	1
32	1	3	3	3
33	1	4	6	8
34	1	2	3	2
35	2	4	10	2
Totals	124	818	296	292

Note:

* Members who only participate in one order do not have a Markov matrix and thus remain unclassified