

## Supporting Appendix

# Cooperative Behavior Cascades in Human Social Networks

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### **NOTE: THIS VERSION OF THE SUPPORTING APPENDIX SUPERCEDES THE VERSION ORIGINALLY PUBLISHED.**

While helping out with a replication study, we recently discovered some mistakes in the R code used to generate the results. These mistakes related to the handling of the index labels for clustering standard errors in some of the models. Relatedly, we also made some adjustments to the way groups were defined for the persistence and group-based regressions, and, in some cases, to the censoring procedure for interval regression. Fixing this coding generally yielded small *decreases* in the reported standard errors. Hence, some of our results, as reported, were unduly conservative. Most of the results are unchanged.

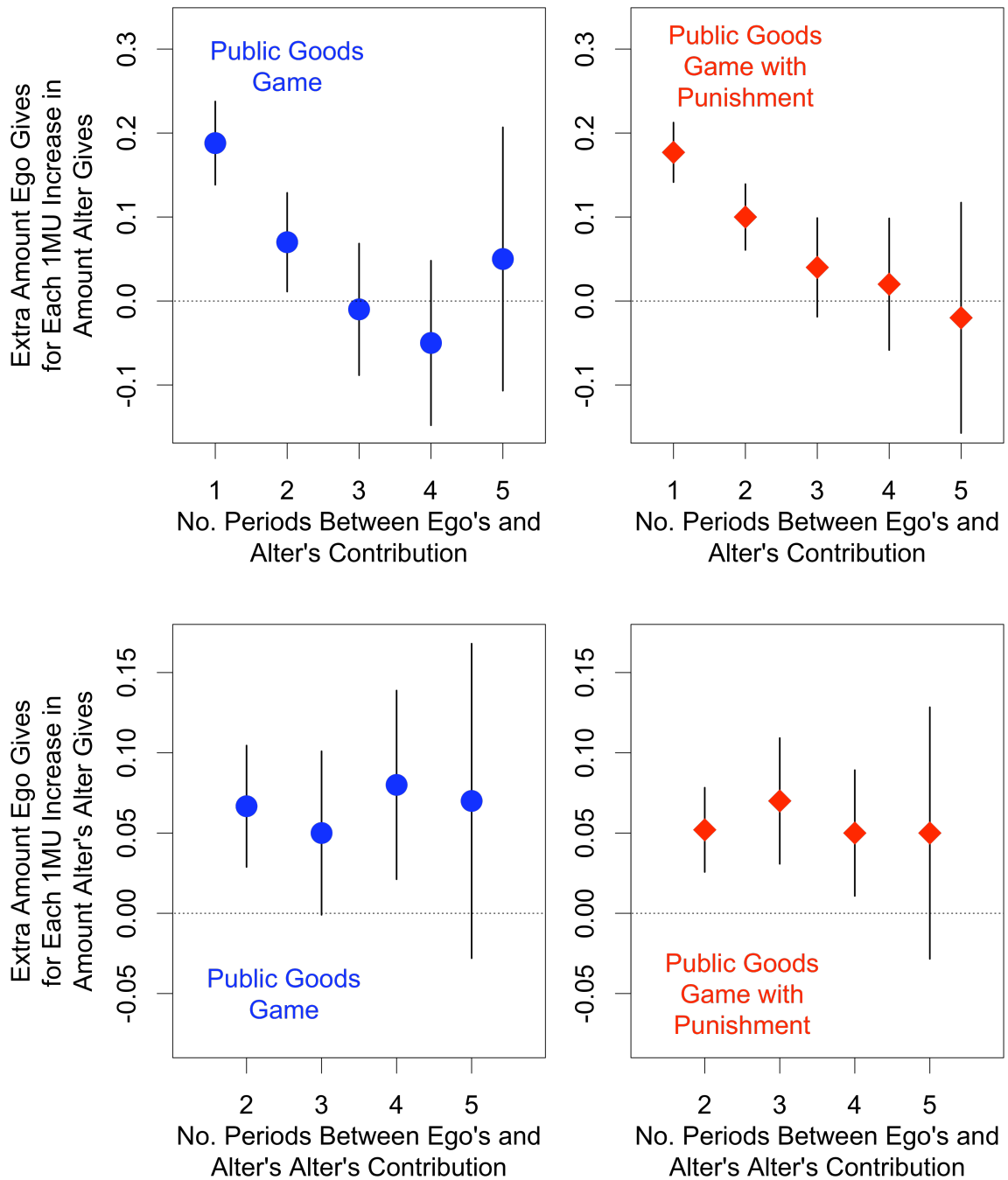
However, there are changes in three substantive interpretations that should be noted:

1. In **Table S1d** we now report that the effect of alter's alter's alter's alter's contribution on ego's contribution is significant for the ordinary public goods game (we previously reported that it was not significant). This suggests that donation cascades may actually extend up to 4 degrees of separation in public goods games (in contrast to the 2 degrees result we originally reported).
2. In **Tables S2a-d** we now report that the effect of alter's contribution on ego's contribution persists only up to two periods (Tables S2a-S2d), and not more than that. See corrected Fig. 4 below. In other words, if A treats B kindly, then B will go on to be kind to C in the next period and also B will go on to be kind to D in the period after that. This persistence across time is, as noted in the paper, a separate matter than the spread across individuals (where A is kind to B and then B is kind to C and then C is kind to D), which is the main focus of the paper.
3. In **Table S5b** we now report that the effect of Alter's Alter's Received Punishment on Ego's Contribution is significant (we previously reported that it was not significant). This suggests that punishment might, in fact, spur cooperation cascades.

In Tables S1a-S1d, we show regression results used to estimate the total effects shown in Fig. 3 of the main text. The right-most points (4 degrees of separation) in Fig. 3 are incorrect in the published text—they should be 0.27 (95% C.I. 0.05 to 0.49) for the public goods game and 0.07 (95% C.I. -0.05 to 0.23) for the public goods game with punishment.

In Tables S1a and S2a-S2d, we show regression results used to estimate the effects shown in the top two panels of Fig. 4 of the main text. In Tables S1b and S3a-S3c, we show regression results used to estimate the effects shown in the bottom two panels of Fig. 4 of the main text. The corrected figure is shown on the following page.

In Tables S4a-b we show regression results used to estimate the mediation effect of alter's contribution on the relationship between alter's contribution and ego's contribution. What this mediation analysis shows is that, as we theorized, the total effect of alter's contribution on ego disappears when we control for the effect of alter on ego. This is a classic mediation result. Suppose that  $X$  affects  $M$  and  $M$  affects  $Y$ , then  $X$  can affect  $Y$  via its influence on  $M$ . In this case  $X$  is the alter's contribution,  $M$  is the alter's contribution, and  $Y$  is the ego's contribution. To test whether or not a mediation effect is present requires two regressions, (1) regress  $M$  on  $X$  (first model in Tables S4a and S4b), and (2) regress  $Y$  on  $M$  and  $X$  (second model in Tables S4a and S4b). According to Sobel (1982),  $M$  is a mediator if the product of the coefficients on  $X$  in the first regression and  $M$  in the second regression is



**Figure 4 (Corrected).** The total effect of alter's giving on ego's giving persists beyond the initial period. (Upper) Alter significantly influences ego's behavior up to two periods later in the public goods game (Left) and the public goods game with punishment (Right). (Lower) Alter's alter (two degrees of separation) significantly influences ego's behavior up to four periods later in the public goods game (Left) and the public goods game with punishment (Right). Estimates are from interval regressions, controlling for multiple observations of the same ego, multiple observations of the same alter, the ego's initial contribution in the period in which alter's (or alter's alter's) contribution was made, and period fixed effects. Vertical bars show 95% confidence intervals.

significant ( $p < 0.001$  in both the public goods game and the public goods game with punishment). Furthermore, we note that the effect of alter's alter is no longer significant in the second regression, suggesting that  $X$  has no independent influence on  $Y$ . In other words, alter's alter's effect on ego results from alter's alter's effect on alter and then alter's effect on ego. In Tables S5a-b we show regression results used to estimate the effect of alter's alter's and alter's alter's alter's punishment behavior on ego's contribution.

In Tables S6a and S6b, we demonstrate that egos are not more influenced by "selfish" behavior than by "generous" behavior. In other words, alter's effect on ego does not vary for high and low contributions (increasing alter's contribution from 0MUs and 10MUs has the same effect on ego as increasing from 10MUs to 20MUs). In Table S6a, we use the *median contribution across groups and rounds* as a point of reference to divide high and low contributions, and in Table S6b we use the *ego's own contribution* as a point of reference.

In Table S7a and S7b, we explore the possibility that groups rather than specific individuals influence ego's behavior. In Table S7a, we show that alter significantly influences ego even when we include the contributions made by the other two members of the group as a control. In Table S7b, we test the influence of the other two member's contributions on alter's effect on ego by adding an interaction term to the model. The effect is significant in the public goods game but not in the public goods game with punishment, and in both cases the effect size is negligible. When other members of the group increase their contributions, it decreases the influence of alter on ego by 0.004. If we hold other group members' contributions constant at 10 each, the model suggests that an additional MU contributed by alter increases the contribution of ego in the next period by 0.160MUs, but if we increase other group members' contributions by 1MU, then an additional MU contributed by alter increases the contribution of ego in the next

period by 0.156MUs. And even when others contribute maximally, alter's effect on ego remains significant ( $p=0.04$ ).

In Table S8, we show that punishment behavior does not spread from alters to ego. In Tables S9a-S9c, we study the effect of groups of alters rather than individual alters. These models show that the sum total of contributions by all alters in the group significantly influence ego's contribution up to two degrees of separation in the normal public goods game and up to three degrees of separation in the public goods game with punishment, mirroring the individual-level results in Tables S1a-S1c. We present these results to show that the effects are robust to specification.

In Tables S10a and S10b, we add additional lags to the model of alter's influence on ego and alter's alter's influence on ego. Note that the model results reported in Table S10 indicate that alter and alter's alter significantly influence ego in both the public goods game and the public goods game with punishment, and the effect sizes are nearly identical. However, the cost of these models is dramatically reduced sample size (and therefore the efficiency of estimation) since each additional lag eliminates one period of observations.

Finally, in Table S11, we add 235 fixed effects for each unique subject (except the baseline subject, since a constant is in the model). This method has the advantage of controlling for all fixed differences between individuals and/or sessions, but it is well known to generate coefficients that are biased towards zero, especially when the number of fixed effects is large, as it is here. In spite of the conservative nature of this technique, we find that alter continues to have large and significant effects on ego as in the models without fixed effects.

**Table S1a: Effect of Alter's Contribution on Ego's Contribution**

	<i>Dependent Variable:</i>					
	<i>Ego's Contribution in Period t</i>					
	<i>Public Goods Game</i>			<i>Public Goods Game with Punishment</i>		
	<i>Coef.</i>	<i>S.E.</i>	<i>p</i>	<i>Coef.</i>	<i>S.E.</i>	<i>p</i>
<i>Alter's Contrib. Period t – 1</i>	<b>0.19</b>	<b>0.03</b>	<b>0.00</b>	<b>0.18</b>	<b>0.02</b>	<b>0.00</b>
<i>Ego's Contribution Period t – 1</i>	0.98	0.03	0.00	0.82	0.02	0.00
<i>Period 3</i>	-1.11	0.54	0.04	-0.20	0.30	0.50
<i>Period 4</i>	-1.11	0.52	0.03	-0.62	0.28	0.03
<i>Period 5</i>	-1.24	0.54	0.02	-0.16	0.30	0.60
<i>Period 6</i>	-2.64	0.60	0.00	-0.91	0.37	0.01
<i>Constant</i>	-3.89	0.51	0.00	2.26	0.38	0.00
<i>Log Likelihood</i>		-7721			-8190	
<i>Null Log Likelihood</i>		-8499			-9035	
<i>N</i>		3480			3480	

Interval regression models of effect of alter's contribution on ego's contribution, controlling for ego's prior contribution, period fixed effects, and multiple observations of the same ego and multiple observations of the same alter using Huber-White sandwich standard errors.

**Table S1b: Effect of Alter's Alter's Contribution on Ego's Contribution**

	<i>Dependent Variable:</i>					
	<i>Ego's Contribution in Period t</i>					
	<i>Public Goods Game</i>			<i>Public Goods Game with Punishment</i>		
	<i>Coef.</i>	<i>S.E.</i>	<i>p</i>	<i>Coef.</i>	<i>S.E.</i>	<i>p</i>
<i>Alter's Alter's Contribution Period t – 2</i>	<b>0.07</b>	<b>0.02</b>	<b>0.00</b>	<b>0.05</b>	<b>0.01</b>	<b>0.00</b>
<i>Ego's Contribution Period t – 2</i>	0.90	0.02	0.00	0.70	0.02	0.00
<i>Period 4</i>	-0.69	0.30	0.02	-0.56	0.16	0.00
<i>Period 5</i>	-0.77	0.37	0.04	-0.33	0.21	0.11
<i>Period 6</i>	-1.60	0.39	0.00	-0.68	0.23	0.00
<i>Constant</i>	-4.57	0.40	0.00	6.49	0.43	0.00
<i>Log Likelihood</i>						
		-18346			-19870	
<i>Null Log Likelihood</i>						
		-19553			-21156	
<i>N</i>						
		8316			8316	

Interval regression models of effect of alter's alter's contribution on ego's contribution, controlling for ego's prior contribution, period fixed effects, and multiple observations of the same ego and multiple observations of the same alter using Huber-White sandwich standard errors.

**Table S1c: Effect of Alter's Alter's Alter's Contribution on Ego's Contribution**

	<i><b>Dependent Variable:</b></i>					
	<i><b>Ego's Contribution in Period t</b></i>					
	<i><b>Public Goods Game</b></i>			<i><b>Public Goods Game with Punishment</b></i>		
	<i>Coef.</i>	<i>S.E.</i>	<i>p</i>	<i>Coef.</i>	<i>S.E.</i>	<i>p</i>
<i>Alter's Alter's Alter's Contrib. Period t – 3</i>	<b>0.03</b>	<b>0.02</b>	<b>0.17</b>	<b>0.06</b>	<b>0.02</b>	<b>0.00</b>
<i>Ego's Contribution Period t – 3</i>	0.77	0.03	0.00	0.65	0.02	0.00
<i>Period 5</i>	-0.53	0.35	0.14	0.06	0.20	0.77
<i>Period 6</i>	-1.65	0.40	0.00	-0.63	0.23	0.01
<i>Constant</i>	-4.85	0.47	0.00	7.74	0.39	0.00
<i>Log Likelihood</i>						
			-13767			-15086
<i>Null Log Likelihood</i>						
			-14353			-15796
<i>N</i>						
			6355			6355

Interval regression models of effect of alter's alter's alter's contribution on ego's contribution, controlling for ego's prior contribution, period fixed effects, and multiple observations of the same ego and multiple observations of the same alter using Huber-White sandwich standard errors.

**Table S1d: Effect of Alter's Alter's Alter's Alter's Contribution on Ego's Contribution**

	<b><i>Dependent Variable:</i></b>					
	<b><i>Ego's Contribution in Period t</i></b>					
	<b><i>Public Goods Game</i></b>			<b><i>Public Goods Game with Punishment</i></b>		
	<i>Coef.</i>	<i>S.E.</i>	<i>p</i>	<i>Coef.</i>	<i>S.E.</i>	<i>p</i>
<i>Alter's Alter's Alter's Alter's Contrib. Period t – 4</i>	<b>0.27</b>	<b>0.11</b>	<b>0.01</b>	<b>0.09</b>	<b>0.07</b>	<b>0.21</b>
<i>Ego's Contribution Period t – 4</i>	0.74	0.12	0.00	0.54	0.08	0.00
<i>Period 6</i>	1.70	1.75	0.33	-1.09	0.76	0.16
<i>Constant</i>	-10.9	2.39	0.00	9.95	1.72	0.00
<i>Log Likelihood</i>						
		-818			-949	
<i>Null Log Likelihood</i>						
		-841			-982	
<i>N</i>						
		405			405	

Interval regression models of effect of alter's alter's alter's alter's contribution on ego's contribution, controlling for ego's prior contribution, period fixed effects, and multiple observations of the same ego and multiple observations of the same alter using Huber-White sandwich standard errors.

**Table S2a: Effect of Alter's Contribution on Ego's Contribution Two Periods Later**

	<i>Dependent Variable:</i>					
	<i>Ego's Contribution in Period t</i>					
	<i>Public Goods Game</i>			<i>Public Goods Game with Punishment</i>		
	<i>Coef.</i>	<i>S.E.</i>	<i>p</i>	<i>Coef.</i>	<i>S.E.</i>	<i>p</i>
<i>Alter's Contrib. Period t – 2</i>	<b>0.07</b>	<b>0.03</b>	<b>0.03</b>	<b>0.10</b>	<b>0.02</b>	<b>0.00</b>
<i>Ego's Contribution Period t – 2</i>	0.90	0.04	0.00	0.70	0.03	0.00
<i>Period 4</i>	-0.88	0.60	0.26	-0.61	0.33	0.06
<i>Period 5</i>	-0.76	0.64	0.23	-0.43	0.35	0.21
<i>Period 6</i>	-1.61	0.69	0.02	-0.82	0.40	0.04
<i>Constant</i>	-4.55	0.65	0.00	5.87	0.49	0.00
<i>Log Likelihood</i>		-6115			-6617	
<i>Null Log Likelihood</i>		-6518			-7052	
<i>N</i>		2772			2772	

Interval regression models of effect of alter's contribution on ego's contribution, controlling for ego's prior contribution, period fixed effects, and multiple observations of the same ego and multiple observations of the same alter using Huber-White sandwich standard errors.

**Table S2b: Effect of Alter's Contribution on Ego's Contribution Three Periods Later**

	<i><b>Dependent Variable:</b></i>					
	<i><b>Ego's Contribution in Period <math>t</math></b></i>					
	<i><b>Public Goods Game</b></i>			<i><b>Public Goods Game with Punishment</b></i>		
	<i>Coef.</i>	<i>S.E.</i>	<i>p</i>	<i>Coef.</i>	<i>S.E.</i>	<i>p</i>
<i>Alter's Contrib. Period <math>t - 3</math></i>	<b>-0.01</b>	<b>0.04</b>	<b>0.73</b>	<b>0.04</b>	<b>0.03</b>	<b>0.19</b>
<i>Ego's Contribution Period <math>t - 3</math></i>	0.78	0.04	0.00	0.64	0.03	0.00
<i>Period 5</i>	-0.74	0.66	0.26	0.02	0.35	0.95
<i>Period 6</i>	-1.55	0.71	0.03	-0.57	0.41	0.17
<i>Constant</i>	-4.44	0.74	0.00	8.02	0.61	0.00
<i>Log Likelihood</i>			-4501			-4933
<i>Null Log Likelihood</i>			-4699			-5169
<i>N</i>			2064			2064

Interval regression models of effect of alter's contribution on ego's contribution, controlling for ego's prior contribution, period fixed effects, and multiple observations of the same ego and multiple observations of the same alter using Huber-White sandwich standard errors.

**Table S2c: Effect of Alter's Contribution on Ego's Contribution Four Periods Later**

	<i><b>Dependent Variable:</b></i>					
	<i><b>Ego's Contribution in Period <math>t</math></b></i>					
	<i><b>Public Goods Game</b></i>			<i><b>Public Goods Game with Punishment</b></i>		
	<i>Coef.</i>	<i>S.E.</i>	<i>p</i>	<i>Coef.</i>	<i>S.E.</i>	<i>p</i>
<i>Alter's Contrib. Period <math>t - 4</math></i>	<b>-0.05</b>	<b>0.05</b>	<b>0.37</b>	<b>0.02</b>	<b>0.04</b>	<b>0.53</b>
<i>Ego's Contribution Period <math>t - 4</math></i>	0.77	0.06	0.00	0.64	0.04	0.00
<i>Period 6</i>	-1.55	0.78	0.05	-0.83	0.42	0.05
<i>Constant</i>	-5.87	0.97	0.00	9.29	0.76	0.00
<i>Log Likelihood</i>		-2825			-3174	
<i>Null Log Likelihood</i>		-2928			-3317	
<i>N</i>		1356			1356	

Interval regression models of effect of alter's contribution on ego's contribution, controlling for ego's prior contribution, period fixed effects, and multiple observations of the same ego and multiple observations of the same alter using Huber-White sandwich standard errors.

**Table S2d: Effect of Alter's Contribution on Ego's Contribution Five Periods Later**

	<i><b>Dependent Variable:</b></i>					
	<i><b>Ego's Contribution in Period <math>t</math></b></i>					
	<i><b>Public Goods Game</b></i>			<i><b>Public Goods Game with Punishment</b></i>		
	<i>Coef.</i>	<i>S.E.</i>	<i>p</i>	<i>Coef.</i>	<i>S.E.</i>	<i>p</i>
<i>Alter's Contrib. Period <math>t - 5</math></i>	<b>0.05</b>	<b>0.08</b>	<b>0.59</b>	<b>-0.02</b>	<b>0.07</b>	<b>0.74</b>
<i>Ego's Contribution Period <math>t - 5</math></i>	0.65	0.09	0.00	0.58	0.07	0.00
<i>Constant</i>	-8.32	1.52	0.00	11.17	1.30	0.00
<i>Log Likelihood</i>			-1289			-1503
<i>Null Log Likelihood</i>			-1316			-1544
<i>N</i>			648			648

Interval regression models of effect of alter's contribution on ego's contribution, controlling for ego's prior contribution, period fixed effects, and multiple observations of the same ego and multiple observations of the same alter using Huber-White sandwich standard errors.

**Table S3a: Effect of Alter's Alter's Contribution on Ego's Contribution  
Three Periods Later**

	<i><b>Dependent Variable:</b></i>					
	<i><b>Ego's Contribution in Period <math>t</math></b></i>					
	<i><b>Public Goods Game</b></i>			<i><b>Public Goods Game with Punishment</b></i>		
	<i>Coef.</i>	<i>S.E.</i>	<i>p</i>	<i>Coef.</i>	<i>S.E.</i>	<i>p</i>
<i>Alter's Alter's Contribution Period <math>t - 3</math></i>	<b>0.05</b>	<b>0.02</b>	<b>0.06</b>	<b>0.07</b>	<b>0.02</b>	<b>0.00</b>
<i>Ego's Contribution Period <math>t - 3</math></i>	0.78	0.03	0.00	0.64	0.02	0.00
<i>Period 5</i>	-0.67	0.31	0.03	-0.03	0.18	0.88
<i>Period 6</i>	-1.41	0.40	0.00	-0.65	0.23	0.00
<i>Constant</i>	-5.02	0.46	0.00	7.58	0.02	0.00
<i>Log Likelihood</i>						
		-13500			-14792	
<i>Null Log Likelihood</i>						
		-14098			-15508	
<i>N</i>						
		6192			6192	

Interval regression models of effect of alter's alter's contribution on ego's contribution, controlling for ego's prior contribution, period fixed effects, and multiple observations of the same ego and multiple observations of the same alter using Huber-White sandwich standard errors.

**Table S3b: Effect of Alter's Alter's Contribution on Ego's Contribution  
Four Periods Later**

	<b><u>Dependent Variable:</u></b>					
	<b><u>Ego's Contribution in Period t</u></b>					
	<b><i>Public Goods Game</i></b>			<b><i>Public Goods Game with Punishment</i></b>		
	<i>Coef.</i>	<i>S.E.</i>	<i>p</i>	<i>Coef.</i>	<i>S.E.</i>	<i>p</i>
<i>Alter's Alter's Contribution Period t – 4</i>	<b>0.08</b>	<b>0.03</b>	<b>0.01</b>	<b>0.05</b>	<b>0.02</b>	<b>0.03</b>
<i>Ego's Contribution Period t – 4</i>	0.76	0.04	0.00	0.63	0.03	0.00
<i>Period 6</i>	-1.43	0.38	0.00	-0.87	0.22	0.00
<i>Constant</i>	-7.14	0.62	0.00	8.96	0.48	0.00
<i>Log Likelihood</i>		-8487			-9518	
<i>Null Log Likelihood</i>		-8785			-9951	
<i>N</i>		4068			4068	

Interval regression models of effect of alter's alter's contribution on ego's contribution, controlling for ego's prior contribution, period fixed effects, and multiple observations of the same ego and multiple observations of the same alter using Huber-White sandwich standard errors.

**Table S3c: Effect of Alter's Alter's Contribution on Ego's Contribution Five Periods Later**

	<i><b>Dependent Variable:</b></i>					
	<i><b>Ego's Contribution in Period <math>t</math></b></i>					
	<i><b>Public Goods Game</b></i>			<i><b>Public Goods Game with Punishment</b></i>		
	<i>Coef.</i>	<i>S.E.</i>	<i>p</i>	<i>Coef.</i>	<i>S.E.</i>	<i>p</i>
<i>Alter's Alter's Contribution Period <math>t - 5</math></i>	<b>0.07</b>	<b>0.05</b>	<b>0.15</b>	<b>0.05</b>	<b>0.04</b>	<b>0.18</b>
<i>Ego's Contribution Period <math>t - 5</math></i>	0.65	0.05	0.00	0.58	0.04	0.00
<i>Constant</i>	-8.62	0.89	0.00	10.27	0.71	0.00
<i>Log Likelihood</i>						
		-3866			-4508	
<i>Null Log Likelihood</i>						
		-3948			-4630	
<i>N</i>						
		1944			1944	

Interval regression models of effect of alter's alter's contribution on ego's contribution, controlling for ego's prior contribution, period fixed effects, and multiple observations of the same ego and multiple observations of the same alter using Huber-White sandwich standard errors.

**Table S4a: Mediation Analysis, Public Goods Game**

	<i>Dependent Variable:</i>								
	<i>Ego's Contribution in Period t</i>			<i>Alter's Contribution in Period t-1</i>			<i>Ego's Contribution in Period t</i>		
	<i>Coef.</i>	<i>S.E.</i>	<i>p</i>	<i>Coef.</i>	<i>S.E.</i>	<i>p</i>	<i>Coef.</i>	<i>S.E.</i>	<i>p</i>
<i>Alter's Alter's Contrib. Period t – 2</i>	<b>0.07</b>	<b>0.02</b>	<b>0.00</b>	<b>0.28</b>	<b>0.03</b>	<b>0.00</b>	0.03	0.02	0.15
<i>Alter's Contribution Period t – 1</i>	---	---	---	---	---	---	<b>0.24</b>	<b>0.03</b>	<b>0.00</b>
<i>Ego's Contribution Period t – 2</i>	0.90	0.04	0.00	0.03	0.02	0.11	0.90	0.04	0.00
<i>Period 4</i>	-0.69	0.60	0.25	-2.17	0.67	0.00	-0.38	0.59	0.52
<i>Period 5</i>	-0.77	0.63	0.23	-3.42	0.67	0.00	-0.29	0.63	0.64
<i>Period 6</i>	-1.60	0.68	0.02	-4.49	0.72	0.00	-1.03	0.68	0.13
<i>Constant</i>	-4.57	0.60	0.00	4.51	0.62	0.00	-6.27	0.64	0.00
<i>Log Likelihood</i>	-18346			-20756			-18257		
<i>Null Log Likelihood</i>	-19553			-20970			-19553		
<i>N</i>	8316			8316			8316		

Interval regression models of ego and alter contributions, controlling for multiple observations of the same ego and multiple observations of the same alter using Huber-White sandwich standard errors. The results in the first model show that the size of the total effect of alter's alter on ego is 0.07 (95% C.I. 0.03 to 0.10). We can use the results of the second and third model to calculate the size of the indirect effect of alter's alter on ego that is mediated by alter, which is 0.07 (95% C.I. 0.05 to 0.09). We note that, as theorized, the effect of alter's alter is no longer significant when we control for alter. These results together mean we cannot reject the hypothesis that the total effect of alter's alter on ego is mediated by the effect of alter's alter on alter.

**Table S4b: Mediation Analysis, Public Goods Game with Punishment**

	<i>Dependent Variable:</i>								
	<i>Ego's Contribution in Period t</i>			<i>Alter's Contribution in Period t – 1</i>			<i>Ego's Contribution in Period t</i>		
	<i>Coef.</i>	<i>S.E.</i>	<i>p</i>	<i>Coef.</i>	<i>S.E.</i>	<i>p</i>	<i>Coef.</i>	<i>S.E.</i>	<i>p</i>
<i>Alter's Alter's Contrib. Period t – 2</i>	<b>0.05</b>	<b>0.01</b>	<b>0.00</b>	<b>0.19</b>	<b>0.03</b>	<b>0.00</b>	0.03	0.02	0.15
<i>Alter's Contribution Period t – 1</i>							<b>0.17</b>	<b>0.02</b>	<b>0.00</b>
<i>Ego's Contribution Period t – 2</i>	0.70	0.03	0.00	0.01	0.01	0.38	0.70	0.03	0.00
<i>Period 4</i>	-0.56	0.33	0.09	0.91	0.38	0.02	-0.70	0.33	0.03
<i>Period 5</i>	-0.33	0.34	0.34	1.20	0.38	0.00	-0.51	0.34	0.13
<i>Period 6</i>	-0.68	0.40	0.09	2.46	0.41	0.00	-1.00	0.40	0.01
<i>Constant</i>	6.49	0.43	0.00	12.17	0.44	0.00	4.40	0.50	0.00
<i>Log Likelihood</i>			-19870			-21631			-19791
<i>Null Log Likelihood</i>			-21156			-21811			-21156
<i>N</i>			8316			8316			8316

Interval regression models of ego and alter contributions, controlling for multiple observations of the same ego and multiple observations of the same alter using Huber-White sandwich standard errors. The results in the first model show that the size of the total effect of alter's alter on ego is 0.05 (95% C.I. 0.03 to 0.08). We can use the results of the second and third model to calculate the size of the indirect effect of alter's alter on ego that is mediated by alter, which is 0.03 (95% C.I. 0.02 to 0.05). We note that, as theorized, the effect of alter's alter is no longer significant when we control for alter. These results together mean we cannot reject the hypothesis that the total effect of alter's alter on ego is mediated by the effect of alter's alter on alter.

**Table S5a: Effect of Alter's Received Punishment on Ego's Contribution Two Rounds Later**

	<i><b>Dependent Variable:</b></i>		
	<i><b>Ego's Contribution in Period <math>t</math></b></i>		
	<i>Coef.</i>	<i>S.E.</i>	<i>p</i>
<i>Punishment Rec'd by Alter in Period <math>t - 2</math></i>	<b>0.13</b>	<b>0.05</b>	<b>0.02</b>
<i>Alter's Contribution in Period <math>t - 2</math></i>	0.18	0.03	0.00
<i>Punishment Rec'd by Ego in Period <math>t - 2</math></i>	0.45	0.07	0.00
<i>Ego's Contribution in Period <math>t - 2</math></i>	0.86	0.03	0.00
<i>Period 4</i>	-1.14	0.33	0.00
<i>Period 5</i>	-0.98	0.34	0.00
<i>Period 6</i>	-1.45	0.40	0.00
<i>Constant</i>	1.82	0.62	0.00
<i>Log Likelihood</i>		-6565	
<i>Null Log Likelihood</i>		-7052	
<i>N</i>		2772	

Interval regression models of effect of alter's received punishment on ego's contribution, controlling for ego's prior received punishment and ego's and alter's prior contribution, period fixed effects, and multiple observations of the same ego and multiple observations of the same alter using Huber-White sandwich standard errors.

**Table S5b: Effect of Alter's Alter's Received Punishment on Ego's Contribution Three Rounds Later**

	<i><b>Dependent Variable:</b></i>		
	<i><b>Ego's Contribution in Period <math>t</math></b></i>		
	<i>Coef.</i>	<i>S.E.</i>	<i>p</i>
<i>Punishment Rec'd by Alter's Alter in Period <math>t - 3</math></i>	<b>0.15</b>	<b>0.04</b>	<b>0.00</b>
<i>Alter's Alter's Contribution in Period <math>t - 3</math></i>	0.08	0.02	0.00
<i>Punishment Rec'd by Ego in Period <math>t - 3</math></i>	0.29	0.04	0.00
<i>Ego's Contribution in Period <math>t - 3</math></i>	0.74	0.03	0.00
<i>Period 5</i>	-0.32	0.19	0.09
<i>Period 6</i>	-0.96	0.23	0.00
<i>Constant</i>	5.33	0.48	0.00
<i>Log Likelihood</i>		-14760	
<i>Null Log Likelihood</i>		-15508	
<i>N</i>		6192	

Interval regression models of effect of alter's alter's received punishment on ego's contribution, controlling for ego's prior received punishment and ego's and alter's alter's prior contribution, period fixed effects, and multiple observations of the same ego and multiple observations of the same alter's alter using Huber-White sandwich standard errors.

**Table S6a: Effect of Alter's Contribution on Ego's Contribution is Similar Regardless of Whether Alter's Contribution is High or Low**

	<i><u>Dependent Variable:</u></i>					
	<i><u>Ego's Contribution in Period t</u></i>					
	<i>Public Goods Game</i>			<i>Public Goods Game with Punishment</i>		
	<i>Coef.</i>	<i>S.E.</i>	<i>p</i>	<i>Coef.</i>	<i>S.E.</i>	<i>p</i>
<i>Alter's Contrib. Period t – 1 X</i>						
<i>Alter's Contrib. Period t – 1 &gt; Median</i>	<b>-0.23</b>	<b>0.14</b>	<b>0.10</b>	<b>0.02</b>	<b>0.10</b>	<b>0.87</b>
<i>Alter's Contrib. Period t – 1 &gt; Median</i>	3.23	0.88	0.00	-0.28	1.86	0.88
<i>Alter's Contrib. Period t – 1</i>	0.23	0.13	0.07	0.17	0.03	0.00
<i>Ego's Contribution Period t – 1</i>	0.98	0.03	0.00	0.82	0.02	0.00
<i>Period 3</i>	-1.09	0.54	0.04	-0.20	0.30	0.51
<i>Period 4</i>	-1.06	0.52	0.04	-0.62	0.28	0.03
<i>Period 5</i>	-1.18	0.54	0.03	-0.15	0.30	0.62
<i>Period 6</i>	-2.53	0.60	0.00	-0.91	0.37	0.01
<i>Constant</i>	-4.28	0.55	0.00	2.28	0.42	0.00
<i>Log Likelihood</i>		-7714			-8190	
<i>Null Log Likelihood</i>		-8499			-9035	
<i>N</i>		3480			3480	

Interval regression models of effect of alter's contribution on ego's contribution, controlling for ego's prior contribution, period fixed effects, and multiple observations of the same ego and multiple observations of the same alter using Huber-White sandwich standard errors. Interaction term shows the differential effect of being a higher-than-median (across groups and rounds) contributor. The interaction term is not significant, suggesting the ego does not pay more attention to higher-than-median contributors.

**Table S6b: Effect of Alter's Contribution on Ego's Contribution is Similar Regardless of Whether Alter's Contribution is Above or Below Ego's Contribution**

	<i>Dependent Variable:</i>					
	<i>Ego's Contribution in Period t</i>					
	<i>Public Goods Game</i>			<i>Public Goods Game with Punishment</i>		
	<i>Coef.</i>	<i>S.E.</i>	<i>p</i>	<i>Coef.</i>	<i>S.E.</i>	<i>p</i>
<i>Alter's Contrib. Period t – 1 X</i>						
<i>Ego's Contrib. &gt; Alter's Contrib. Period t – 1</i>	<b>-0.11</b>	<b>0.07</b>	<b>0.11</b>	<b>-0.02</b>	<b>0.05</b>	<b>0.70</b>
<i>Ego's Contrib. &gt; Alter's Contrib. Period t – 1</i>	1.83	0.69	0.00	0.51	0.77	0.51
<i>Alter's Contrib. Period t – 1</i>	0.26	0.04	0.00	0.20	0.04	0.00
<i>Ego's Contribution Period t – 1</i>	0.93	0.04	0.00	0.80	0.03	0.00
<i>Period 3</i>	-1.10	0.54	0.04	-0.21	0.30	0.49
<i>Period 4</i>	-1.13	0.52	0.03	-0.62	0.28	0.03
<i>Period 5</i>	-1.28	0.54	0.02	-0.16	0.30	0.60
<i>Period 6</i>	-2.64	0.60	0.00	-0.91	0.37	0.01
<i>Constant</i>	-4.67	0.60	0.00	1.93	0.61	0.00
<i>Log Likelihood</i>		-7717			-8190	
<i>Null Log Likelihood</i>		-8499			-9035	
<i>N</i>		3480			3480	

Interval regression models of effect of alter's contribution on ego's contribution, controlling for ego's prior contribution, period fixed effects, and multiple observations of the same ego and multiple observations of the same alter using Huber-White sandwich standard errors.

Interaction term shows the differential effect of being a higher-than-median (across groups and rounds) contributor. The interaction term is not significant, suggesting the ego does not pay more attention to alters who contribute more than they did.

**Table S7a: Effect of Alter's Contribution on Ego's Contribution,  
Controlling for Others' Contributions**

	<u>Dependent Variable:</u>					
	<u>Ego's Contribution in Period t</u>					
	<i>Public Goods Game</i>			<i>Public Goods Game with Punishment</i>		
	<i>Coef.</i>	<i>S.E.</i>	<i>p</i>	<i>Coef.</i>	<i>S.E.</i>	<i>p</i>
<i>Alter's Contrib. Period t – 1</i>	<b>0.17</b>	<b>0.03</b>	<b>0.00</b>	<b>0.17</b>	<b>0.02</b>	<b>0.00</b>
<i>Ego's Contribution Period t – 1</i>	0.95	0.03	0.00	0.81	0.02	0.00
<i>Other's Contribution Period t – 1</i>	0.17	0.03	0.00	0.17	0.01	0.00
<i>Period 3</i>	-0.77	0.53	0.15	-0.61	0.29	0.03
<i>Period 4</i>	-0.34	0.51	0.51	-1.34	0.28	0.00
<i>Period 5</i>	-0.22	0.54	0.56	-1.01	0.29	0.00
<i>Period 6</i>	-1.47	0.61	0.59	-2.06	0.37	0.00
<i>Constant</i>	-6.70	0.59	0.00	-1.90	0.44	0.00
<i>Log Likelihood</i>			-7673			-8101
<i>Null Log Likelihood</i>			-8499			-9035
<i>N</i>			3480			3480

Interval regression models of effect of alter's contribution on ego's contribution, controlling for ego's prior contribution, period fixed effects, and multiple observations of the same ego and multiple observations of the same alter using Huber-White sandwich standard errors.

**Table S7b: Effect of Interaction Between Alter's Contribution and Others' Contributions on Ego's Contribution**

	<u>Dependent Variable:</u>					
	<u>Ego's Contribution in Period t</u>					
	<i>Public Goods Game</i>			<i>Public Goods Game with Punishment</i>		
	<i>Coef.</i>	<i>S.E.</i>	<i>p</i>	<i>Coef.</i>	<i>S.E.</i>	<i>p</i>
<i>Alter's Contrib. Period t – 1 X</i>						
<i>Other's Contribution Period t – 1</i>	<b>-0.004</b>	<b>0.002</b>	<b>0.05</b>	<b>-0.001</b>	<b>0.002</b>	<b>0.49</b>
<i>Alter's Contrib. Period t – 1</i>	0.24	0.04	0.00	0.21	0.06	0.00
<i>Other's Contribution Period t – 1</i>	0.20	0.02	0.00	0.19	0.03	0.00
<i>Ego's Contribution Period t – 1</i>	0.95	0.03	0.00	0.81	0.02	0.00
<i>Period 3</i>	-0.81	0.53	0.13	-0.63	0.29	0.03
<i>Period 4</i>	-0.38	0.51	0.45	-1.34	0.28	0.00
<i>Period 5</i>	-0.25	0.54	0.64	-1.01	0.29	0.00
<i>Period 6</i>	-1.48	0.61	0.02	-2.05	0.37	0.00
<i>Constant</i>	-7.20	0.62	0.00	-2.45	0.81	0.00
<i>Log Likelihood</i>		-7671			-8101	
<i>Null Log Likelihood</i>		-8499			-9035	
<i>N</i>		3480			3480	

Interval regression models of effect of an interaction between alter's contribution and others' contributions on ego's contribution, controlling for alter's contribution, others' contributions, ego's prior contribution, period fixed effects, and multiple observations of the same ego and multiple observations of the same alter using Huber-White sandwich standard errors.

**Table S8: Effect of Alter's Punishment Behavior on Ego's Punishment Behavior**

	<i>Dependent Variable: Punishment in the Public Goods Game with Punishment</i>		
	<i>Coef.</i>	<i>S.E.</i>	<i>p</i>
<i>Alters' Punishments Directed at Ego in Period <math>t - 1</math></i>	<b>0.01</b>	<b>0.04</b>	<b>0.83</b>
<i>Ego's Punishments in Period <math>t - 1</math></i>	0.72	0.06	0.00
<i>Period 3</i>	0.84	0.36	0.02
<i>Period 4</i>	0.50	0.31	0.10
<i>Period 5</i>	0.21	0.33	0.54
<i>Period 6</i>	0.13	0.30	0.67
<i>Constant</i>	-0.92	0.31	0.00
<i>Log Likelihood</i>		-2150	
<i>Null Log Likelihood</i>		-2306	
<i>N</i>		1160	

Interval regression models of effect of alters' punishments of ego on ego's punishments of others in the next round, controlling for ego's prior punishment behavior, period fixed effects, and multiple observations of the same ego using Huber-White sandwich standard errors.

**Table S9a: Effect of Alter Group's Contribution on Ego's Contribution**

	<i>Dependent Variable:</i>					
	<i>Ego's Contribution in Period t</i>					
	<i>Public Goods Game</i>			<i>Public Goods Game with Punishment</i>		
	<i>Coef.</i>	<i>S.E.</i>	<i>p</i>	<i>Coef.</i>	<i>S.E.</i>	<i>p</i>
<i>Alter Group's Contrib. Period t – 1</i>	<b>0.17</b>	<b>0.02</b>	<b>0.00</b>	<b>0.17</b>	<b>0.02</b>	<b>0.00</b>
<i>Ego's Contribution Period t – 1</i>	0.95	0.07	0.00	0.81	0.05	0.00
<i>Period 3</i>	-0.77	0.96	0.42	-0.61	0.52	0.24
<i>Period 4</i>	-0.34	0.78	0.67	-1.34	0.40	0.00
<i>Period 5</i>	-0.22	0.88	0.80	-1.01	0.53	0.05
<i>Period 6</i>	-1.47	0.91	0.11	-2.06	0.60	0.00
<i>Constant</i>	-6.70	1.15	0.00	-1.90	0.89	0.03
<i>Log Likelihood</i>		-2558			-2700	
<i>Null Log Likelihood</i>		-2833			-3012	
<i>N</i>		1160			1160	

Interval regression models of effect of alter group's total contributions on ego's contribution, controlling for ego's prior contribution, period fixed effects, and multiple observations of the same ego and multiple observations of the same alter using Huber-White sandwich standard errors.

**Table S9b: Effect of Alter's Alter Group's Contribution on Ego's Contribution**

	<b><u>Dependent Variable:</u></b>					
	<b><u>Ego's Contribution in Period t</u></b>					
	<b>Public Goods Game</b>			<b>Public Goods Game with Punishment</b>		
	<i>Coef.</i>	<i>S.E.</i>	<i>p</i>	<i>Coef.</i>	<i>S.E.</i>	<i>p</i>
<i>Alter's Alter Group's Contribution Period t – 2</i>	<b>0.05</b>	<b>0.02</b>	<b>0.00</b>	<b>0.04</b>	<b>0.01</b>	<b>0.00</b>
<i>Ego's Contribution Period t – 2</i>	0.89	0.08	0.00	0.69	0.04	0.00
<i>Period 4</i>	-0.29	0.83	0.73	-0.96	0.46	0.03
<i>Period 5</i>	0.21	1.13	0.85	-0.99	0.61	0.17
<i>Period 6</i>	-0.19	1.23	0.88	-1.56	0.61	0.05
<i>Constant</i>	-8.51	2.00	0.00	2.63	1.52	0.08
<i>Log Likelihood</i>						
		-2034			-2202	
<i>Null Log Likelihood</i>						
		-2173			-2351	
<i>N</i>						
		924			924	

Interval regression models of effect of alter's alter group's total contributions on ego's contribution, controlling for ego's prior contribution, period fixed effects, and multiple observations of the same ego and multiple observations of the same alter using Huber-White sandwich standard errors.

**Table S9c: Effect of Alter's Alter's Alter Group's Contribution on Ego's Contribution**

	<i><b>Dependent Variable:</b></i>					
	<i><b>Ego's Contribution in Period t</b></i>					
	<i><b>Public Goods Game</b></i>			<i><b>Public Goods Game with Punishment</b></i>		
	<i>Coef.</i>	<i>S.E.</i>	<i>p</i>	<i>Coef.</i>	<i>S.E.</i>	<i>p</i>
<i>Alter's Alter's Alter Group's Contribution</i>						
<i>Period t – 3</i>	<b>0.02</b>	<b>0.02</b>	<b>0.24</b>	<b>0.03</b>	<b>0.01</b>	<b>0.00</b>
<i>Ego's Contribution Period t – 3</i>	0.78	0.10	0.00	0.64	0.08	0.00
<i>Period 5</i>	-0.95	0.83	0.25	-1.22	0.57	0.03
<i>Period 6</i>	-1.43	1.10	0.20	-2.08	0.80	0.00
<i>Constant</i>	-6.29	0.07	0.00	5.21	1.48	0.00
<i>Log Likelihood</i>		-2228			-2031	
<i>Null Log Likelihood</i>		-2299			-2116	
<i>N</i>		688			688	

Interval regression models of effect of alter's alter's alter group's total contributions on ego's contribution, controlling for ego's prior contribution, period fixed effects, and multiple observations of the same ego and multiple observations of the same alter using Huber-White sandwich standard errors.

**Table S10a: Effect of Alter's Contribution on Ego's Contribution in a Model That Includes Additional Lags of Ego's Behavior**

	<i>Dependent Variable:</i>					
	<i>Ego's Contribution in Period t</i>					
	<i>Public Goods Game</i>			<i>Public Goods Game with Punishment</i>		
	<i>Coef.</i>	<i>S.E.</i>	<i>p</i>	<i>Coef.</i>	<i>S.E.</i>	<i>p</i>
<i>Alter's Contrib. Period t – 1</i>	<b>0.23</b>	<b>0.05</b>	<b>0.00</b>	<b>0.16</b>	<b>0.04</b>	<b>0.00</b>
<i>Ego's Contrib. Period t – 1</i>	0.80	0.06	0.00	0.55	0.07	0.00
<i>Ego's Contrib. Period t – 2</i>	0.32	0.07	0.00	0.21	0.07	0.00
<i>Ego's Contrib. Period t – 3</i>	0.03	0.07	0.62	0.03	0.06	0.64
<i>Ego's Contrib. Period t – 4</i>	0.18	0.06	0.00	0.27	0.06	0.00
<i>Period 6</i>	-0.99	0.65	0.13	-1.10	0.37	0.00
<i>Constant</i>	-9.17	0.80	0.00	-0.30	0.80	0.71
<i>Log Likelihood</i>			-2621			-3027
<i>Null Log Likelihood</i>			-2928			-3317
<i>N</i>			1356			1356

Interval regression models of effect of alter's contribution on ego's contribution, controlling for ego's prior contributions in periods t-1, t-2, t-3, and t-4, a fixed effect for period 6 (vs. period 5), and multiple observations of the same ego and multiple observations of the same alter using Huber-White sandwich standard errors.

**Table S10b: Effect of Alter's Alter's Contribution on Ego's Contribution in a Model That Includes Additional Lags of Ego's Behavior**

	<i><b>Dependent Variable:</b></i>					
	<i><b>Ego's Contribution in Period t</b></i>					
	<i><b>Public Goods Game</b></i>			<i><b>Public Goods Game with Punishment</b></i>		
	<i>Coef.</i>	<i>S.E.</i>	<i>p</i>	<i>Coef.</i>	<i>S.E.</i>	<i>p</i>
<i>Alter's Alter's Contrib. Period t – 1</i>	<b>0.07</b>	<b>0.03</b>	<b>0.03</b>	<b>0.06</b>	<b>0.02</b>	<b>0.00</b>
<i>Ego's Contrib. Period t – 1</i>	0.70	0.07	0.00	0.50	0.06	0.00
<i>Ego's Contrib. Period t – 2</i>	0.22	0.07	0.00	0.15	0.06	0.02
<i>Ego's Contrib. Period t – 3</i>	0.25	0.06	0.00	0.30	0.06	0.00
<i>Period 6</i>	-0.65	0.72	0.36	-0.85	0.40	0.03
<i>Constant</i>	-8.66	0.85	0.00	3.41	0.69	0.00
<i>Log Likelihood</i>			-8187			-9280
<i>Null Log Likelihood</i>			-8785			-9951
<i>N</i>			4068			4068

Interval regression models of effect of alter's alter's contribution on ego's contribution, controlling for ego's prior contributions in periods t-1, t-2, and t-3, a fixed effect for period 6 (vs. period 5), and multiple observations of the same ego and multiple observations of the same alter using Huber-White sandwich standard errors.

**Table S11: Effect of Alter's Contribution on Ego's Contribution in a Model That Includes Ego Fixed Effects**

	<i><b>Dependent Variable:</b></i>					
	<i><b>Ego's Contribution in Period <math>t</math></b></i>					
	<i><b>Public Goods Game</b></i>			<i><b>Public Goods Game with Punishment</b></i>		
	<i>Coef.</i>	<i>S.E.</i>	<i>p</i>	<i>Coef.</i>	<i>S.E.</i>	<i>p</i>
<i>Alter's Contrib. Period <math>t - 1</math></i>	<b>0.17</b>	<b>0.02</b>	<b>0.00</b>	<b>0.14</b>	<b>0.02</b>	<b>0.00</b>
<i>Period 3</i>	-2.41	0.42	0.00	1.16	0.24	0.00
<i>Period 4</i>	-4.02	0.40	0.00	1.52	0.23	0.00
<i>Period 5</i>	-5.41	0.43	0.00	2.40	0.25	0.00
<i>Period 6</i>	-7.36	0.50	0.00	2.06	0.30	0.00
<i>Constant</i>	0.50	1.58	0.75	13.21	0.38	0.00
<i>Log Likelihood</i>		-6699			-7292	
<i>Null Log Likelihood</i>		-8499			-9035	
<i>N</i>		3480			3480	

Interval regression models of effect of alter's contribution on ego's contribution, controlling for ego's prior contribution, period fixed effects, ego fixed effects for 235 subjects, and multiple observations of the same ego and multiple observations of the same alter using Huber-White sandwich standard errors. Coefficients on fixed effects not shown.