Supplemental information for *Costly fairness in children is influenced by who is watching*

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Table S1
Breakdown of participants by study, condition, age group and gender

		6 & 7			**8 & 9**		
		Total	Female	Male	**Total**	Female	Male
Study 1	Public	**37**	20	17	**35**	20	15
	Recipient Ignorant	**33**	16	17	**41**	23	18
	Private	**32**	17	15	**34**	17	17
Study 2	Public	**.**	.	.	**43**	22	21
	Recipient Ignorant	**.**	.	.	**45**	22	23
	Peer Audience	**.**	.	.	**46**	23	23

Table S2

Estimate and bootstrapped confidence intervals (1000 simulations) of fixed effects in mixed models predicting participants' rejections. Baselines for factors were: Allocation = equal, Condition = public/recipient ignorant, Actor gender = female, Block order = equal block first. Table also shows goodness-of-fit statistics. * indicates that 0 is outside the confidence interval.

	Study 1: full	***Study 1: full with age as category***	***Study 1: reduced with Recipient Ignorant baseline***	***Study 2: reduced with Recipient Ignorant baseline***	***Study 1: gender interaction***	***Study 2: gender interaction***	***Study 1: age difference included***	***Study 2: age difference included***
Intercept	-2.94*	-2.92*	-2.25*	-2.35*	-3.25*	-4.59*	-2.95*	-2.94*
	[-3.63; -2.36]	[-3.74; -2.18]	[-2.83; -1.67]	[-2.99; -1.77]	[-3.96; -2.61]	[-11.26; -3.54]	[-3.54; -2.35]	[-3.71; -2.27]
Allocation: Unequal	2.67*	2.11*	1.33*	1.98*	3.08*	4.87*	2.66*	2.79*
	[2.16; 3.23]	[1.49; 2.84]	[0.94; 1.77]	[1.49; 2.49]	[2.56; 3.68]	[3.89; 11.50]	[2.17; 3.16]	[2.22; 3.40]
Condition: Recipient Ignorant	0.69	1.21*			0.74*	1.85*	0.70	0.60
	[-0.04; 1.40]	[0.28; 2.17]			[0.06; 1.47]	[0.39; 8.43]	[-0.00; 1.39]	[-0.18; 1.41]
Condition: Private	0.57	0.09	-0.09		0.63		0.61	
	[-0.14; 1.31]	[-0.98; 1.13]	[-0.76; 0.60]		[-0.10; 1.34]		[-0.14; 1.32]	
Age (scaled)	-0.19		-0.13	-0.21	-0.10	-0.25*	-0.15	-0.22
	[-0.76; 0.36]		[-0.40; 0.16]	[-0.46; 0.01]	[-0.40; 0.18]	[-0.49; -0.01]	[-0.43; 0.13]	[-0.44; 0.01]
Actor gender: Male	-0.05	-0.04	-0.04	-0.15	0.52	2.31*	-0.04	-0.14
	[-0.52; 0.42]	[-0.49; 0.41]	[-0.50; 0.44]	[-0.61; 0.32]	[-0.03; 1.06]	[1.03; 8.92]	[-0.44; 0.43]	[-0.59; 0.31]
Order: Unequal block first	-0.52*	-0.49*	-0.50*	0.05	-0.50*	0.03	-0.50*	0.02
	[-0.98; -0.06]	[-0.96; -0.04]	[-0.94; -0.07]	[-0.41; 0.48]	[-0.95; -0.05]	[-0.48; 0.52]	[-0.93; -0.05]	[-0.44; 0.50]
Allocation x Condition: Unequal x Recipient Ignorant	-1.30*	-1.84*			-1.37*	-2.17*	-1.33*	-0.81*
	[-1.96; -0.64]	[-2.77; -1.04]			[-2.09; -0.74]	[-8.76; -0.87]	[-1.97; -0.67]	[-1.57; -0.05]
Allocation x Condition: Unequal x Private	-1.66*	-1.32*	-0.38		-1.72*		-1.71*	
	[-2.37; -0.94]	[-2.32; -0.34]	[-0.99; 0.19]		[-2.37; -1.10]		[-2.34; -1.04]	
Allocation x Age: Unequal x Age	1.05*		0.84*		0.80*		0.84*	
	[0.58; 1.59]		[0.57; 1.09]		[0.54; 1.07]		[0.60; 1.10]	
Condition: Peer Audience				-0.02		1.99*		0.58
				[-0.77; 0.71]		[0.60; 8.76]		[-0.26; 1.38]
Allocation x Condition: Unequal x Peer Audience				-0.36		-3.17*		-1.17*
				[-1.04; 0.33]		[-9.82; -1.84]		[-1.94; -0.44]
Condition x Age: Recipient Ignorant x Age	-0.28							
	[-1.00; 0.45]							
Condition x Age: Private x age	0.65							
	[-0.10; 1.49]							
Allocation x Condition x Age: Unequal x Recipient Ignorant x Age	-0.12							
	[-0.84;							

	0.54]							
Allocation x Condition x Age: Unequal x Private x Age	-0.63							
	[-1.42; 0.04]							
Age group: 8&9		-0.11						
		[-1.24; 0.95]						
Allocation x Age group: Unequal x 8&9		1.14*						
		[0.21; 2.19]						
Condition x Age group: Recipient Ignorant x 8&9		-0.95						
		[-2.35; 0.47]						
Condition x Age group: Private x 8&9		0.94						
		[-0.40; 2.53]						
Allocation x Condition x Age group: Unequal x Recipient Ignorant x 8&9		0.92						
		[-0.38; 2.26]						
Allocation x Condition x Age group: Unequal x Private x 8&9		-0.63						
		[-2.06; 0.76]						
Condition: Public			-0.70	-0.58				
			[-1.40; 0.00]	[-1.43; 0.22]				
Allocation x Condition: Unequal x Public			1.33*	0.81*				
			[0.75; 1.98]	[0.11; 1.61]				
Allocation x Actor gender: Unequal x Male					-0.83*	-3.27*		
					[-1.30; -0.31]	[-9.84; -2.00]		
Condition x Actor gender: Recipient Ignorant x Male						-1.80*		
						[-8.38; -0.02]		
Condition x Actor gender: Peer Audience x Male						-2.07*		
						[-8.76; -0.38]		
Allocation x Condition x Actor Gender: Unequal x Recipient Ignorant x Male						1.96*		
						[0.29; 8.22]		
Allocation x Condition x Actor Gender: Unequal x Peer Audience x Male						3.17*		
						[1.62; 9.77]		
Age difference between Actor and Recipient (scaled)							0.09	
							[-0.14; 0.32]	
Age difference between Actor and Recipient (scaled)								0.09
								[-0.14; 0.32]
AIC	2163.41	2184.44	2164.07	1545.42	2155.46	1522.08	2165.41	1546.85
BIC	2251.02	2272.06	2228.32	1599.25	2225.55	1602.82	2235.50	1606.06
Log Likelihood	-1066.70	-1077.22	-1071.04	-762.71	-1065.73	-746.04	-1070.70	-762.42
Number of trials	2543	2543	2543	1608	2543	1608	2543	1608
Number of pairs	212	212	212	134	212	134	212	134
Participant Identity (Intercept)	1.72	1.78	1.75	1.24	1.76	1.39	1.73	1.23

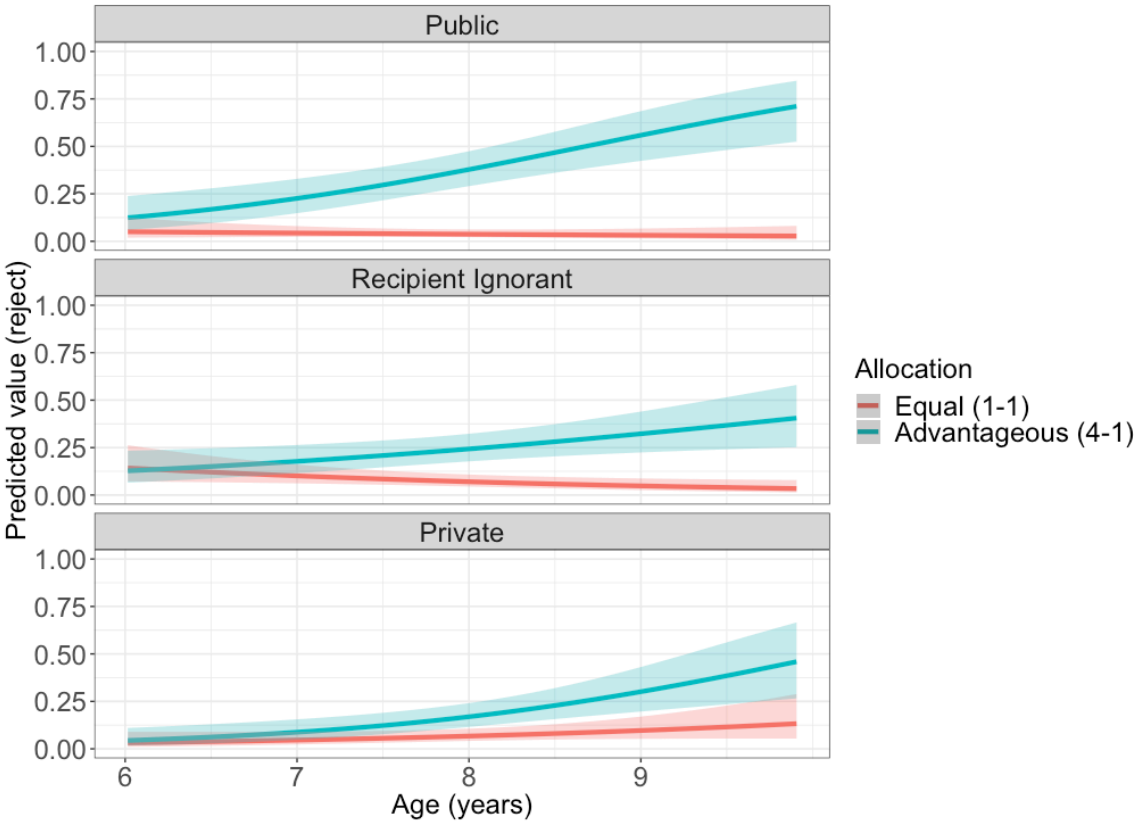

Figure S1. Estimates from GLMM of children's probability of rejecting allocations in Study 1 as a function of distribution, age and condition. Ribbons show 95% confidence intervals.

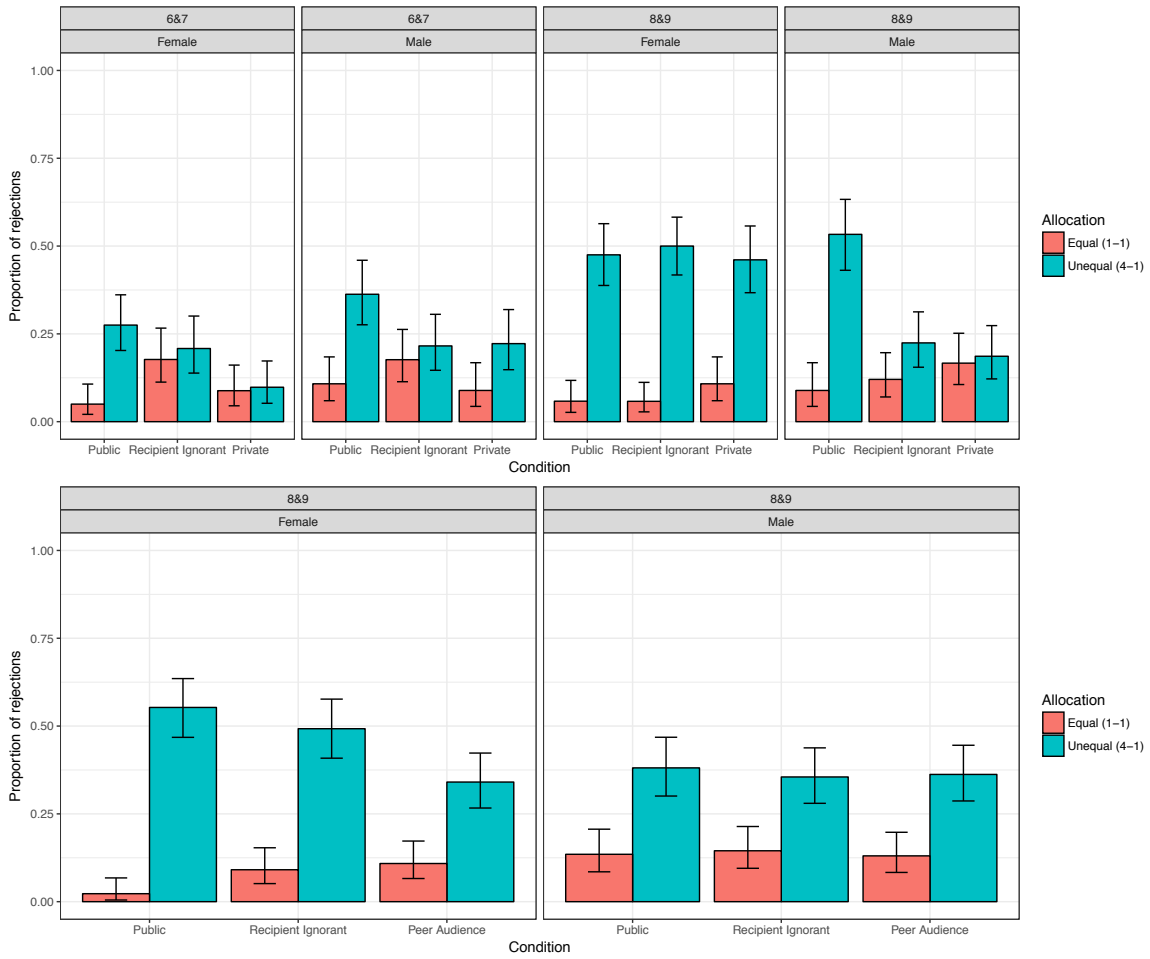

Figure S2. Proportion of rejected trials in Studies 1 (top panel) and 2 (bottom panel) across age group, allocation, condition and actor gender. Error bars show 95% CIs.

Power analysis

We used the R package 'simr' (Green & MacLeod, 2016) to conduct power analyses. Using the data structure from Study 1, we assessed our power to detect an effect size of log odds = 1.3 (Odds Ratio = 3.7), a medium-sized effect according to http://imaging.mrc-cbu.cam.ac.uk/statswiki/FAQ/effectSize..

Our effect of interest was the three-way interaction between allocation (equal, unequal), condition (public, recipient ignorant, private) and scaled age.

We tested for power to detect an effect size of beta = 1.3 at the level of unequal x private x age.

Details

model from Study 1 to assess data structure (covariance matrices for fixed and random effects):

model <- rejection (1/0) ~ Fixed Effects (allocation + condition + age + gender + order + allocation x age + allocation x condition + condition x age + allocation x condition x age) + Random Effects (subject identity fit as intercepts)

input effect size for three-way interaction between allocation x condition x age at the levels of unequal x private x age.

fixef(model)["eq.unequneq:conditionPrivate:actor.age.calc.scaled"] <- 1.3

1,000 simulations to assess power

powerSim(model, test = fixed("eq.unequneq:conditionPrivate:actor.age.calc.scaled"), nsim = 1000)

Output

Power + 95% confidence interval = 85.20% (82.85, 87.34)

Reference

Green P and MacLeod CJ (2016). "simr: an R package for power analysis of generalised linear mixed models by simulation." *Methods in Ecology and Evolution*, **7**(4), pp. 493–498. doi: 10.1111/2041-210X.12504, https://CRAN.R-project.org/package=simr.