Pay It Forward

Theory and Experiment

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ASSA Meetings
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  - Usually: how to encourage giving from A to B? The end.
  - see Sugden, 1984; Falk and Fischbacher, 2008; Fehr and Gachter, 2000; McCullough et al., 2008

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Generalized Reciprocity

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- **Generalized reciprocity:** giving can encourage further giving
  - **If A gives to B, B more likely to give to C**
  - see Gray, Ward, and Norton 2014; Willer et al., 2013; Yoeli et al., 2013; Khadjavi, 2015

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Over 900 cars paid for each other's meals at a Dairy Queen drive-thru in Minnesota

By Alisha Ebrahimji, CNN
Updated 7:25 PM ET, Wed December 9, 2020

'Pay-it-forward' at Dairy Queen brings customers and staff to tears 02:49

(CNN) — What started as a random act of kindness from one man paying for the car behind him in a Dairy Queen drive-thru resulted in over 900 cars also taking part in the pay it forward chain.

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What Supports Generalized Reciprocity?

- What are the conditions under which generalized reciprocity thrives?
  - Psychological game theoretic framework extending Dufwenberg and Kirchsteiger (2004) and Fehr and Schmidt (1999)
  - Roles of altruism, reciprocity, inequity aversion

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What Supports Generalized Reciprocity?

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  - Psychological game theoretic framework extending Dufwenberg and Kirchsteiger (2004) and Fehr and Schmidt (1999)
  - Roles of altruism, reciprocity, inequity aversion
- How to encourage B to give to C after receiving a gift from A?
  - B is both a giver and a receiver
    - Relevant considerations as giver: altruism, equity
    - Relevant considerations as receiver: reciprocity

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What we do:

- Within-subject design: two sequential games
- Model which predicts behavior at each node of the game
- Within-subject across-node comparisons

Preview of results:

- Quantify importance of "psychological components" on behavior
- Altruism plays largest role, necessary to explain both A's and B's behavior
- Reciprocity plays second largest role, uniquely explains B's pay it forward behavior
- B's pay it forward behavior does *not* make A more likely to give
  - Inequity aversion marginally helps explain why

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- Generalized reciprocity: people "pay it forward"
  - Ben-ner et al., 2004; Gray et al., 2012; Khadjavi, 2017; McCullough et al., 2008; Mujcic and Leibbrandt, 2019; Willer et al., 2013
  - Our paper: what starts and sustains this behavior?
    - Important for determining how kindness spreads
    - How cultures, norms develop without explicit coordination

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Literature & Contribution

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    - How cultures, norms develop without explicit coordination
- Experiment isolates role of reciprocity in pay it forward giving
  - Related work does not adequately rule out alternative explanations
    - income effects (Herne et al., 2013; van Apeldoorn and Schram, 2016; Simpson et al., 2018; Mujcic and Leibbrandt, 2018)
    - relative wealth differences (Fehr and Schmidt, 1999; Bolton and Ockenfels, 2000)
    - social concerns (Charness and Rabin, 2002; Sobel, 2005; Cox et al., 20008; Malmendier et al., 2014)

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    - social concerns (Charness and Rabin, 2002; Sobel, 2005; Cox et al., 20008; Malmendier et al., 2014)
- Models of fairness
  - Outcome-based fairness (Fehr and Schmidt, 1999; Bolton and Ockenfels, 2000)
  - Intentionality-based fairness (Rabin, 1994; Dufwenberg and Kirchsteiger, 2004; Falk and Fischbacher, 2008)
  - Our results consistent with intentionality-based fairness

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- Generalized reciprocity "chains"
- Players endowed with chips, each worth \$1
  - Blue chips and white chips
  - Can only pass white chips
  - Once passed, a white chip turns into two chips
- **Control:** Asked to give without benefiting from another
- **Treatment:** Asked to give after benefitting from another

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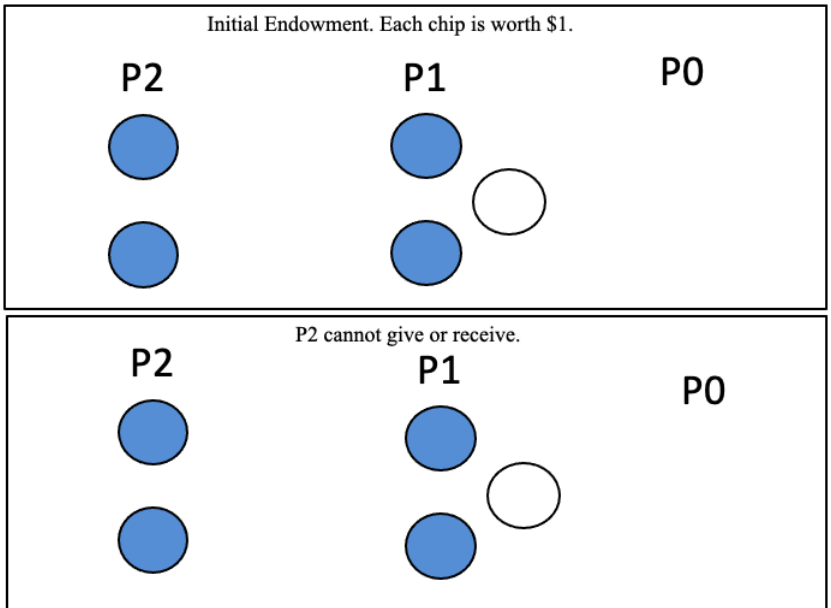
Initial Endowment. Each chip is worth $1.
P2
P1
P0
P2 cannot give or receive.
P2
P1
P0

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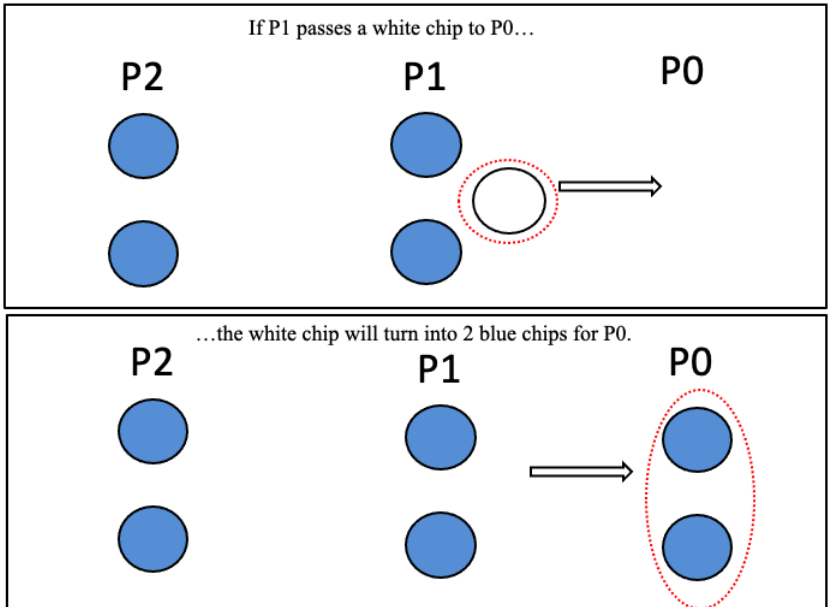
If P1 passes a white chip to P0…
P2
P1
P0
…the white chip will turn into 2 blue chips for P0.
P2
P1
P0

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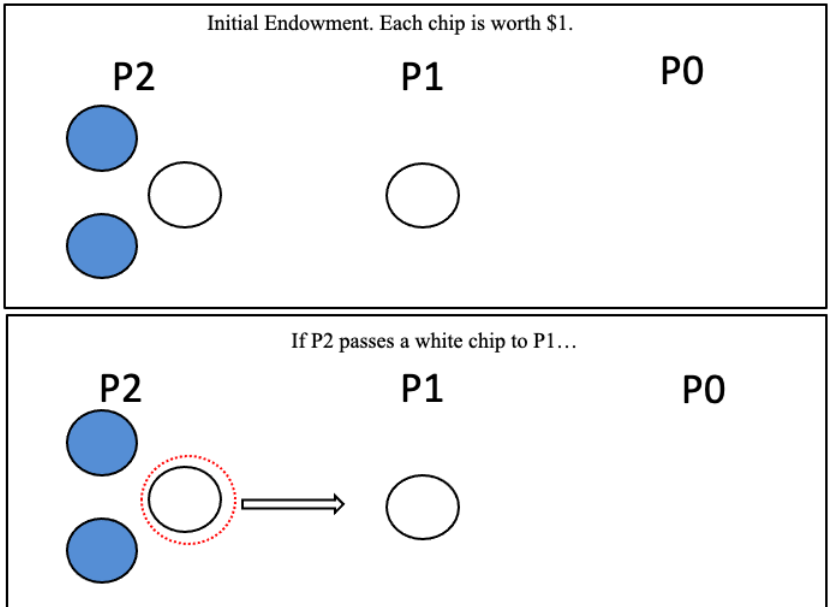
Initial Endowment. Each chip is worth $1.
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P0
If P2 passes a white chip to P1…
P2
P1
P0

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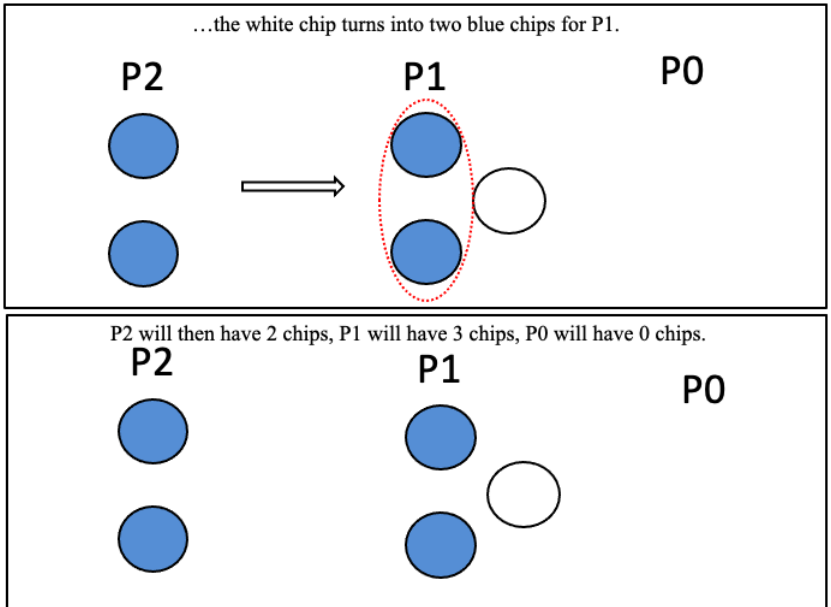
…the white chip turns into two blue chips for P1.
P2
P1
P0
P2 will then have 2 chips, P1 will have 3 chips, P0 will have 0 chips.
P2
P1
P0

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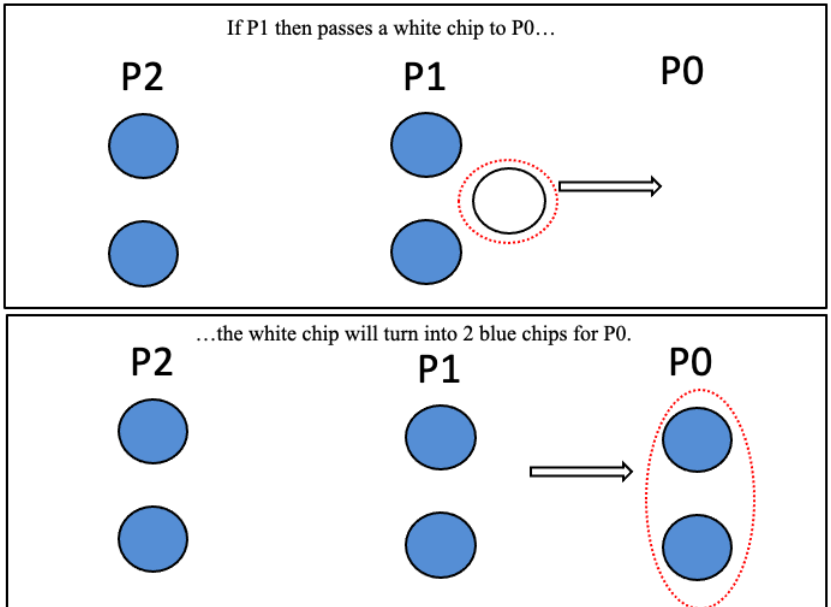
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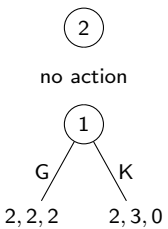
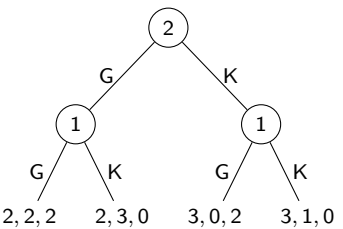
Games

(a) Control



(b) Treatment



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Games

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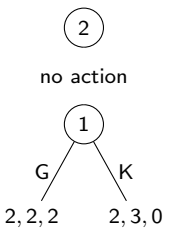

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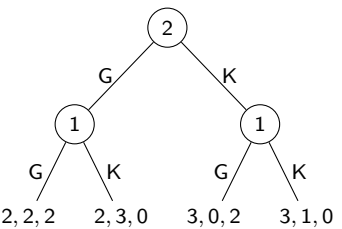

Conditional on P2 giving,

- Keep payoffs the same
-
-

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Games

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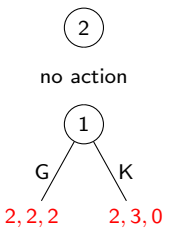

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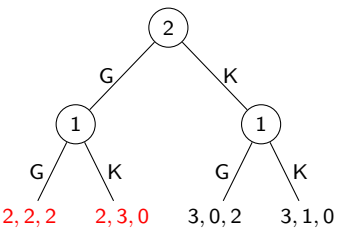

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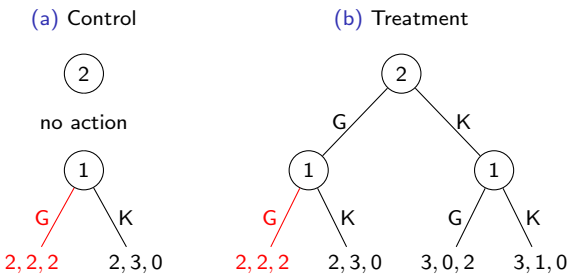

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- If P1 gives, payoffs are (2,2,2)
-

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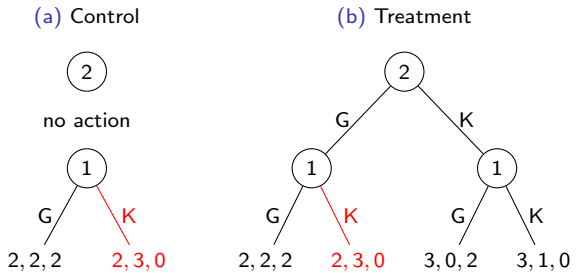
Games



Conditional on P2 giving,

- Keep payoffs the same
- If P1 gives, payoffs are (2,2,2)
- If P1 keeps, payoffs are (2,3,0)

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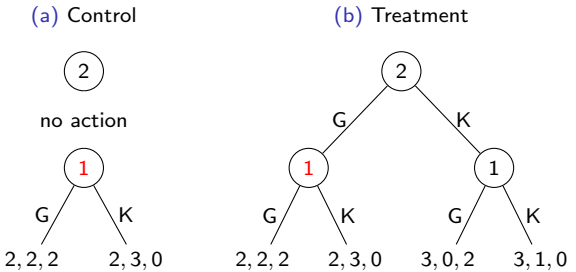
Games



P1's decision is the same across treatment and control if P2 gives

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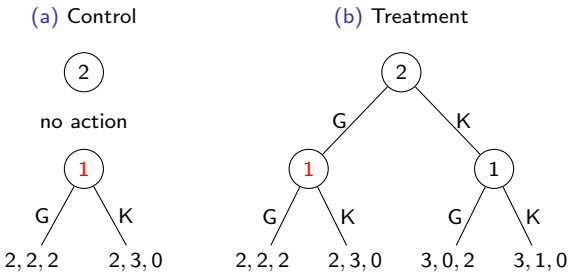
Games



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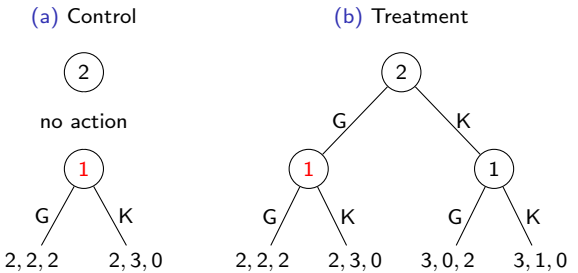
Games



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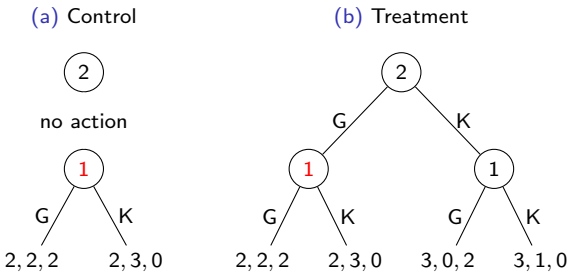

P1's decision is the same across treatment and control if P2 gives

- Has 3 chips, can choose to give 1 to P0
- Only difference: whether chips came from P2 or endowment
- Any pay it forward behavior not due to income effects or social pressure

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We follow Dufwenberg and Kirchsteiger (2004) and Fehr and Schmidt (1999) to construct utility depending on outcomes and beliefs of others' intentions:

$$u_i(\vec{\sigma}) = \pi_i(\sigma) + \underbrace{A_i \sum_{j \neq i} \pi_j(\sigma)}_{\text{altruism}} + \underbrace{\sum_{j,k \neq i} Z_i \kappa_{ij}(\vec{\sigma}) \lambda_{iki}(\vec{\sigma})}_{\text{generalized reciprocity}} - \underbrace{\sum_{s \in S} \sigma(s) E_i}_{\text{inequity aversion}} \quad (1)$$

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- σ is behavioral strategies
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- Z_i - i's generalized reciprocity parameter
- κ_{ij} - i's kindness to j from choosing strategy σ_i
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$$E_i = \overbrace{\alpha_i \frac{1}{n-1} \sum_{j \neq i} \max\{\pi_j(s) - \pi_i(s), 0\}}^{\text{disadvantageous inequity aversion}} + \overbrace{\beta_i \frac{1}{n-1} \sum_{j \neq i} \max\{\pi_i(s) - \pi_j(s), 0\}}^{\text{advantageous inequity aversion}}$$

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10/21

- Amazon Mechanical Turk (Feb-Mar 2021)
  - $N = 403$ subjects
  - 9 subjects per session
  - \$3 for completion, up to \$5 for bonus payments
  - Completed study in 28-29 minutes on average

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  - Randomized into groups and player roles
  - Cannot identify other people in chosen group or what their roles are
- Robustness checks:
  - "Accurate responders": answered at least 2/4 quality check questions correctly on first try ($N = 324$)
  - Accurate responders exc. 28 subjects who completed study in ≥ 45 min ($N = 298$)
  - Answered at least 3/4 quality check questions correctly on first try ($N = 227$)

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Last Movers

12/21

- Different predictions for 8 different models
  - Focus on altruism (A), reciprocity (R), and inequity aversion (I)
  - "Standard" model (S) where only own material payoffs π_i matter

Predicted giving behavior, last movers (P1)

	Model	(1) S	(2) A	(3) I	(4) R	(5) AI	(6) IR	(7) AR	(8) AIR
	Altruism A_i	$= 0$	> 0	$= 0$	$= 0$	> 0	$= 0$	> 0	> 0
	Inequity aversion E_i	$= 0$	$= 0$	> 0	$= 0$	> 0	> 0	$= 0$	> 0
	Reciprocity Z_i	$= 0$	$= 0$	$= 0$	> 0	$= 0$	> 0	> 0	> 0

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	Reciprocity Z_i		$= 0$	$= 0$	$= 0$	> 0	$= 0$	> 0	> 0	> 0
Prop.	**Comparison**		**Predictions**							
	Left node	Right node								
1	**Treatment** after P2 gives	**Treatment** after P2 keeps	~ 0	$\sim$	$\succ 0$	$\succ 0$	$\succ$	$\succ 0$	$\succ$	$\succ$

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- ~ 0: both nodes do not give

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- ~ 0: both nodes do not give
- $\sim$: both nodes equally likely to give
- $\succ 0$: right node does not give; left node may give

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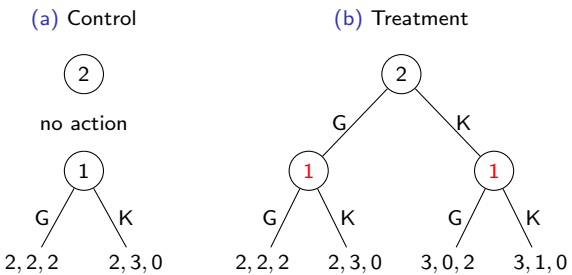
Prop.	**Comparison**		**Predictions**							
	Left node	Right node								
1	**Treatment** after P2 gives	**Treatment** after P2 keeps	~ 0	$\sim$	$\succ 0$	$\succ 0$	$\succ$	$\succ 0$	$\succ$	$\succ$

- ~ 0: both nodes do not give
- $\sim$: both nodes equally likely to give
- $\succ 0$: right node does not give; left node may give
- $\succ$: giving greater at left than right node

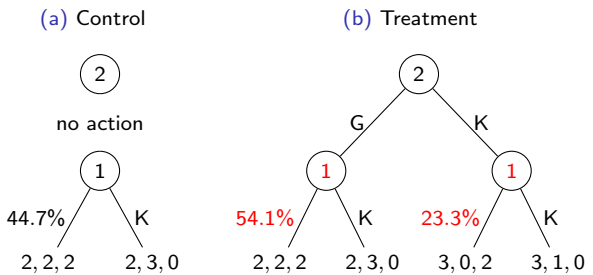
13/21

Giving rates by P1



14/21

Giving rates by P1



- Proposition 1: In Treatment, giving after P2 gives is greater than after P2 keeps ($p < 0.0001$)
  - Consistent with altruism AND either reciprocity or inequity aversion
  - Models AI, AR, AIR

14/21

- Different predictions for 8 different models
  - Focus on altruism (A), reciprocity (R), and inequity aversion (I)
  - "Standard" model (S) where only own material payoffs π_i matter

Predicted giving behavior, last movers (P1)

	Model	(1) S	(2) A	(3) I	(4) R	(5) AI	(6) IR	(7) AR	(8) AIR
	Altruism A_i	$= 0$	> 0	$= 0$	$= 0$	> 0	$= 0$	> 0	> 0
	Inequity aversion E_i	$= 0$	$= 0$	> 0	$= 0$	> 0	> 0	$= 0$	> 0
	Reciprocity Z_i	$= 0$	$= 0$	$= 0$	> 0	$= 0$	> 0	> 0	> 0

- ~ 0: both nodes do not give
- $\sim$: both nodes equally likely to give
- $\succ 0$: right node does not give; left node may give
- $\succ$: giving greater at left than right node

- Different predictions for 8 different models
  - Focus on altruism (A), reciprocity (R), and inequity aversion (I)
  - "Standard" model (S) where only own material payoffs π_i matter

Predicted giving behavior, last movers (P1)

	Model		(1) S	(2) A	(3) I	(4) R	(5) AI	(6) IR	(7) AR	(8) AIR
	Altruism A_i		$=0$	>0	$=0$	$=0$	>0	$=0$	>0	>0
	Inequity aversion E_i		$=0$	$=0$	>0	$=0$	>0	>0	$=0$	>0
	Reciprocity Z_i		$=0$	$=0$	$=0$	>0	$=0$	>0	>0	>0
Prop.	**Comparison**		**Predictions**							
	Left node	Right node								
2	**Treatment** after P2 gives	**Control**	~ 0	$\sim$	$\sim$	$\succ 0$	$\sim$	$\succ$	$\succ$	$\succ$

- ~ 0: both nodes do not give
- $\sim$: both nodes equally likely to give
- $\succ 0$: right node does not give; left node may give
- $\succ$: giving greater at left than right node

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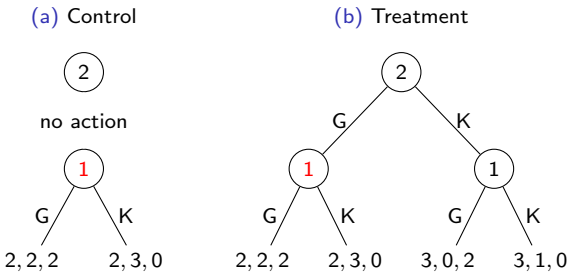
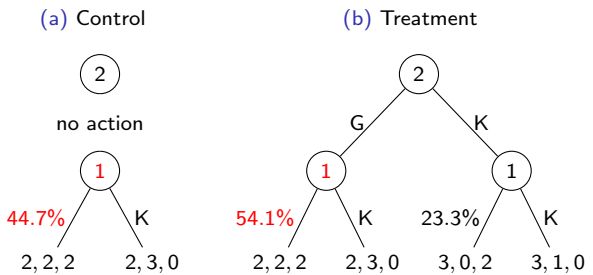
Giving rates by P1



- Proposition 2: Giving in treatment after P2 gives is greater than in control ($p < 0.005$)
  - Consistent with reciprocity AND either altruism or inequity aversion
  - Models with IR, AR, AIR

15/21

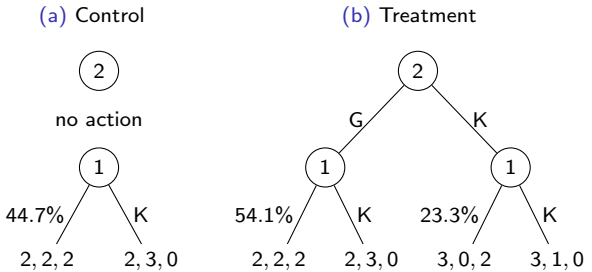
Giving rates by P1



- Proposition 2: Giving in treatment after P2 gives is greater than in control ($p < 0.005$)
  - Consistent with reciprocity AND either altruism or inequity aversion
  - Models with IR, AR, AIR

15/21

Giving rates by P1



- Only Models AR and AIR are consistent with all predictions for P1

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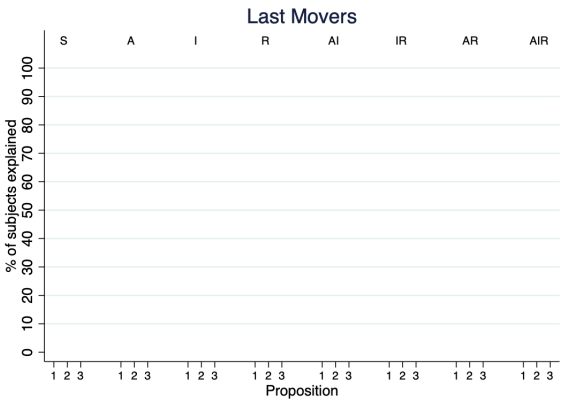
Proportion of last movers' behaviors explained

Tabulate subjects whose behavior can be explained by Propositions 1-2 under different models

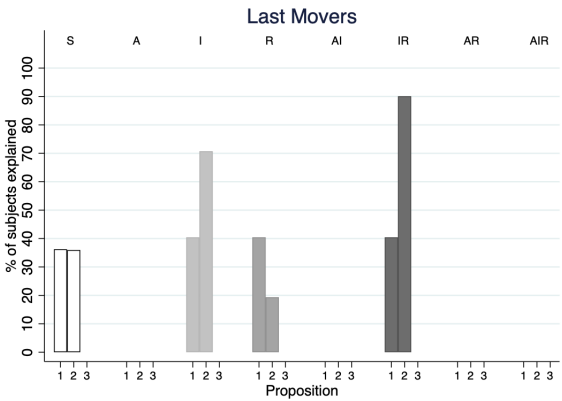


- Y-axis: % subjects whose behaviors are consistent with predictions

16/21

Proportion of last movers' behaviors explained

Tabulate subjects whose behavior can be explained by Propositions 1-2 under different models

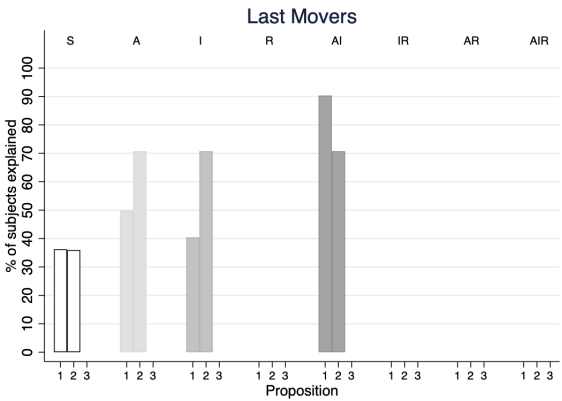


- Models without altruism can only explain 40% of subject behavior

16/21

Proportion of last movers' behaviors explained

Tabulate subjects whose behavior can be explained by Propositions 1-2 under different models

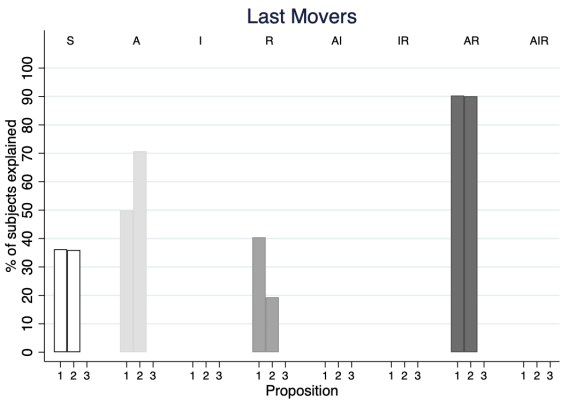


- Models without reciprocity can only explain 70% of subject behavior

16/21

Proportion of last movers' behaviors explained

Tabulate subjects whose behavior can be explained by Propositions 1-2 under different models



- Models without inequity aversion can explain 90% of subject behavior

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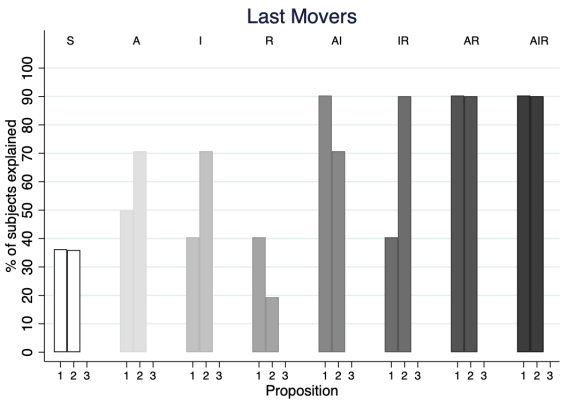
Proportion of last movers' behaviors explained

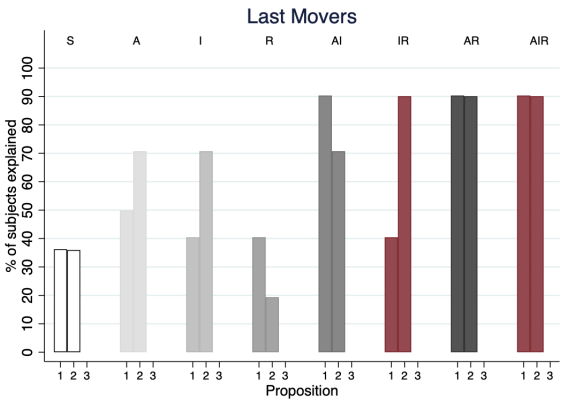
Tabulate subjects whose behavior can be explained by Propositions 1-2 under different models



16/21

Proportion of last movers' behaviors explained

Tabulate subjects whose behavior can be explained by Propositions 1-2 under different models



- 50% more explanatory power if add altruism

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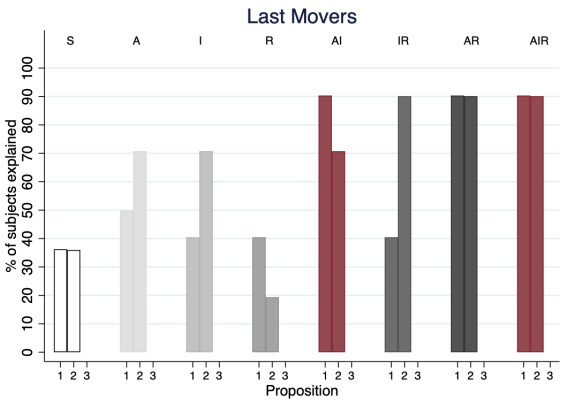
Proportion of last movers' behaviors explained

Tabulate subjects whose behavior can be explained by Propositions 1-2 under different models



- 20% more explanatory power if add reciprocity

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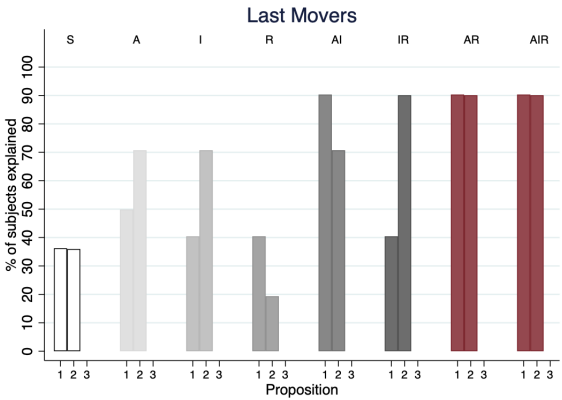
Proportion of last movers' behaviors explained

Tabulate subjects whose behavior can be explained by Propositions 1-2 under different models



- 0% more explanatory power if add inequity aversion (AR vs. AIR models)

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First Movers

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Predicted giving behavior, first movers
(P1 in control, P2 in treatment)

	Model		(1) S	(2) A	(3) I	(4) R	(5) AI	(6) IR	(7) AR	(8) AIR
	Altruism A_i		$=0$	>0	$=0$	$=0$	>0	$=0$	>0	>0
	Inequity aversion E_i		$=0$	$=0$	>0	$=0$	>0	>0	$=0$	>0
	Reciprocity Z_i		$=0$	$=0$	$=0$	>0	$=0$	>0	>0	>0
Prop.	**Comparison**		**Predictions**							
	Left node	Right node								
3	**Treatment** (P2)	**Control** (P1)	~ 0	$\sim$	X	~ 0	X	X	$\succ$	X

- ~ 0: both nodes do not give
- $\sim$: both nodes equally likely to give
- $\succ$: giving greater at left than right node
- X: depends on inequity aversion parameters

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Predicted giving behavior, first movers
(P1 in control, P2 in treatment)

	Model		(1) S	(2) A	(3) I	(4) R	(5) AI	(6) IR	(7) AR	(8) AIR
	Altruism A_i		$=0$	>0	$=0$	$=0$	>0	$=0$	>0	>0
	Inequity aversion E_i		$=0$	$=0$	>0	$=0$	>0	>0	$=0$	>0
	Reciprocity Z_i		$=0$	$=0$	$=0$	>0	$=0$	>0	>0	>0
Prop.	**Comparison**		**Predictions**							
	Left node	Right node								
3	**Treatment** (P2)	**Control** (P1)	~ 0	$\sim$	X	~ 0	X	X	$\succ$	X

- ~ 0: both nodes do not give
- $\sim$: both nodes equally likely to give
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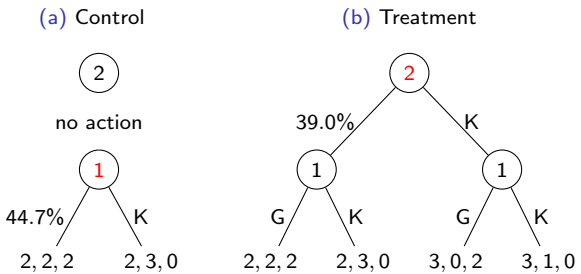
- X: depends on inequity aversion parameters

18/21

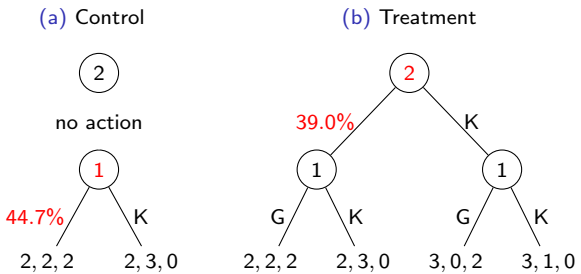
Giving rates by first movers



- Proposition 3: Giving by P2 in treatment is significantly lower than giving by P1 in control ($p < 0.10$)
  - Knowing P1 will pass along P2's kindness does *not* make P2 more likely to give
  - Rather, subjects more likely to give as P1 in control group
    - Can equalize payoffs
  - Cannot equalize payoffs as P2 in treatment groups
    - Cannot control whether P1 will give

19/21

Giving rates by first movers



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  - Knowing P1 will pass along P2's kindness does *not* make P2 more likely to give
  - Rather, subjects more likely to give as P1 in control group
    - Can equalize payoffs
  - Cannot equalize payoffs as P2 in treatment groups
    - Cannot control whether P1 will give

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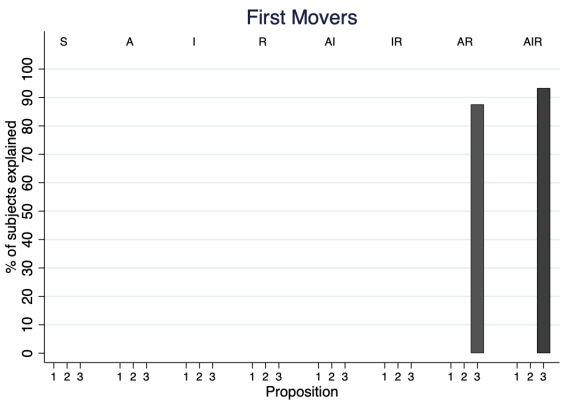
Proportion of first movers' behaviors explained

Tabulate subjects whose behavior can be explained by Proposition 3 under different models

- AR and AIR models best explain P1's behavior
- Question is then whether inequity aversion helps explain P2



- Adding inequity aversion increases % of subjects explained from 87% to 93%
  - Gain in explanatory power of 6%

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Proportion of first movers' behaviors explained

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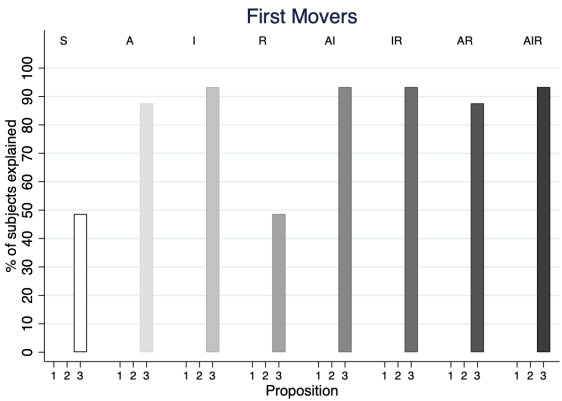

- Altruism, reciprocity don't explain P2's behavior
  - No change in predictive power btwn I, AI, IR, AIR models

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Proportion of first movers' behaviors explained

Tabulate subjects whose behavior can be explained by Proposition 3 under different models

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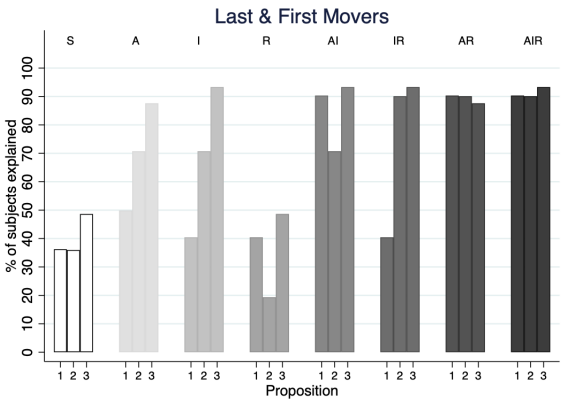
- Question is then whether inequity aversion helps explain P2



- AIR explains behavior best for last & first movers
  -
  -

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Proportion of first movers' behaviors explained

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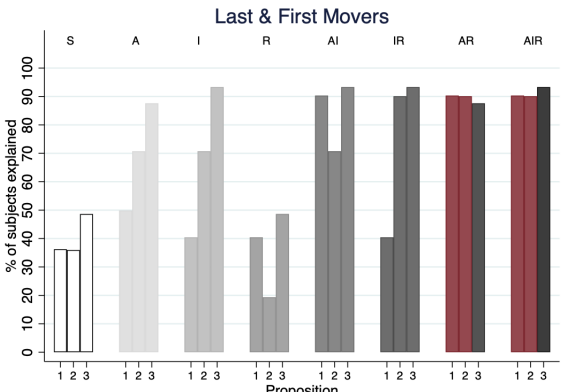

- AIR explains behavior best for last & first movers
  - Altruism and reciprocity explain pay-it-forward behavior
  -

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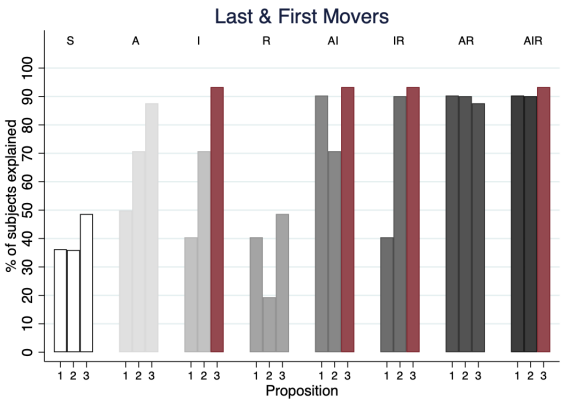
Proportion of first movers' behaviors explained

Tabulate subjects whose behavior can be explained by Proposition 3 under different models

- AR and AIR models best explain P1's behavior
- Question is then whether inequity aversion helps explain P2



- AIR explains behavior best for last & first movers
  - Altruism and reciprocity explain pay-it-forward behavior
  - Inequity aversion marginally explains why giving doesn't grow despite knowing that people will pay forward your generosity

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- Generalized reciprocity important for understanding how kindness spreads
  - Informs how to create cooperative workplaces, neighborhoods, communities

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Conclusion

- Generalized reciprocity important for understanding how kindness spreads
  - Informs how to create cooperative workplaces, neighborhoods, communities
- What are its psychological motivations?

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- We investigate: altruism, reciprocity, inequity aversion

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Conclusion

- Generalized reciprocity important for understanding how kindness spreads
  - Informs how to create cooperative workplaces, neighborhoods, communities
- What are its psychological motivations?
- We investigate: altruism, reciprocity, inequity aversion
  - Altruism and reciprocity high explanatory power in determining why people pay it forward
    - Why they continue chain of kindness once someone else starts it

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Conclusion

- Generalized reciprocity important for understanding how kindness spreads
  - Informs how to create cooperative workplaces, neighborhoods, communities
- What are its psychological motivations?
- We investigate: altruism, reciprocity, inequity aversion
  - Altruism and reciprocity high explanatory power in determining why people pay it forward
    - Why they continue chain of kindness once someone else starts it
  - Inequity aversion marginal explanatory power in determining why people *don't* start it
    - Why it's hard to start chain of kindness in first place
    - Can't control what downstream people will do

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