Preferences for Altrusim

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James Andreoni and John H. Miller, “Giving According to GARP: An Experimental Test of the Consistency of Preferences for Altruism. ” Econometrica, 70 (2), March 2002, 737-753.

1 Modelling Altruistic Choices

Models of fairness:

- Rabin “kindness” requited
- Bolton-Ockenfels: proportional inequality aversion
- Fehr-Schmidt: absolute inequality aversion
- Charness and Rabin expand F-S for "misbehavior"

All make assumptions about what produces fairness, and hence can generate rejections in Ultimatum games, and so on.

Considerations:

- Individual notions of fairness may vary
- Predicting aggregate behavior may not help understand individual preferences
- Carefully designed experiments can always contradict most models

The Approach Here: Revealing a Preference for Altruism

Selfish Money-Maximizer: $U = \pi_s$
Evidence: Many examples that this does not capture behavior.
Unselfish, Altruistic: $U = U(\pi_s, \pi_o)$
Contradictions:

- Disadvantageous Counter-Proposals
- Opportunities matter
- Intentions matter
- framing matters

General Approach: $U = U(\pi_i, \pi_o; \gamma)$

- γ represents "Environment"
- Payoff space $\rightarrow$ Opportunity
- Strategy sets $\rightarrow$ Intentions
- Framing $\rightarrow$ Cognitive cues
- Identity/sex of opponents$\rightarrow$ Social cues
- History of play $\rightarrow$ Learning, reciprocal behavior
- Mood, values, personality$\rightarrow$ Psychological variables

Testable Assumption: For a given γ, preferences will be well-behaved.

Testable Assumption: The affect of shifting γ is systematic.

Research Question for this paper: Within a given setting, can we explain behavior with well-behaved preference ordering?

Research Program: Identify what goes into γ and how preferences are shifted and molded by changes in γ.

Background on Axioms of Revealed preference:

Here we set out conditions that choice behavior must meet in order to be seen as coming from a "rational" consumer with a well defined utility function.

Define: Directly Revealed Prefered. *Consumption bundle A is directly revealed prefered to bundle B if bundle B was affordable when A was purchased. That is, $p_A x_A \geq p_A x_B$.* Write this as $x_A \mathbf{R}^d x_B$.

Define: Strictly Directly Revealed Prefered. *Consumption bundle A is strictly directly revealed prefered to bundle B if bundle B was strictly affordable when A was purchased. That is, $p_A x_A > p_A x_B$.* Write this as $x_A \mathbf{R}^{sd} x_B$.

Define: Revealed Prefered. *Consumption bundle A is revealed prefered to bundle Z if bundle if there is a string of directly revealed preferred relations that connect A to Z. That is, $x_A \mathbf{R}^d x_B$, $x_B \mathbf{R}^d x_C$, $x_C \mathbf{R}^d x_D$..., $x_Y \mathbf{R}^d x_Z$* Write this as $x_A \mathbf{R} x_Z$.

- **Weak Axiom of Revealed Preference (WARP):** *If* $x_A \mathbf{R}^d x_B$ then we will not observe $x_B \mathbf{R}^d x_A$
- **Strong Axiom of Revealed Preference (SARP):** *If* $x_A \mathbf{R} x_B$ then we will not observe $x_B \mathbf{R} x_A$
- **Generalized Axiom of Revealed Preference (GARP):** *If* $x_A \mathbf{R} x_B$ then we will not observe $x_B \mathbf{R}^{sd} x_A$

Revealed preference techniques give us a stong test about whether a particular approach to preferences for fairness is going to be supported by the data.

The objective here will be to apply these axioms in the simplest setting an see if we have any hope for a model of fairness or altrusim.

Method:

- Begin with a non-strategic setting.
  - Strategies matter, but we must build up to that.
- Measure subject's behavior on several different "budgets."
- Keep the environment γ constant across all decisions.
- Is behavior consistent with utility maximization? Are preferences are convex?
- Check the axioms of Revealed Preference, such as GARP.
- Let the data reveal to us the fundamental preferences.
- Estimate preferences that could have generated the data.
- Interpret the economic variables within preferences with psycho-social references.

Is Altruism Rational?

Let π_i be the change in payoff to person i.

$$U_i = U_i(\pi_s, \pi_o). \tag{1}$$

Note that this generalizes to include the pre-experiment the level of consumption.

Dictator Games:

$$\max U_s(\pi_s, \pi_o) \text{ .s.t. } \pi_s + \pi_o = m$$

Generalized Dictator Games:

$$\max U_s(\pi_s, \pi_o) \text{ .s.t. } \pi_s + p\pi_o = m$$

We vary p and m.

2 Experiment Design

Procedures:

- 5 sessions of 34 to 36 subjects each, total of 176 subjects
- Subjects in a large room
- Monitor paid $10.
- Subjects given instructions, pencil, calculator, “claim check.”
- Instructions read aloud, 20 minutes to make decisions.
- Forms returned in blank envelopes, shuffled and taken to another room.
- Subjects are randomly paired and payoffs are calculated.
- Money is placed in envelopes with the claim check number on it.
- The monitor reports that procedures were followed, subjects are paid

Sessions 1–4:

- 8 Budgets $\rightarrow$ 1 point $=$ 10 cents

Divide 60 tokens: Hold ___ at 1 point each, and Pass ___ at 2 points each.

Session 5:

- Part 1: 11 Budgets
- Part 2: 5 Upward Sloping Budgets

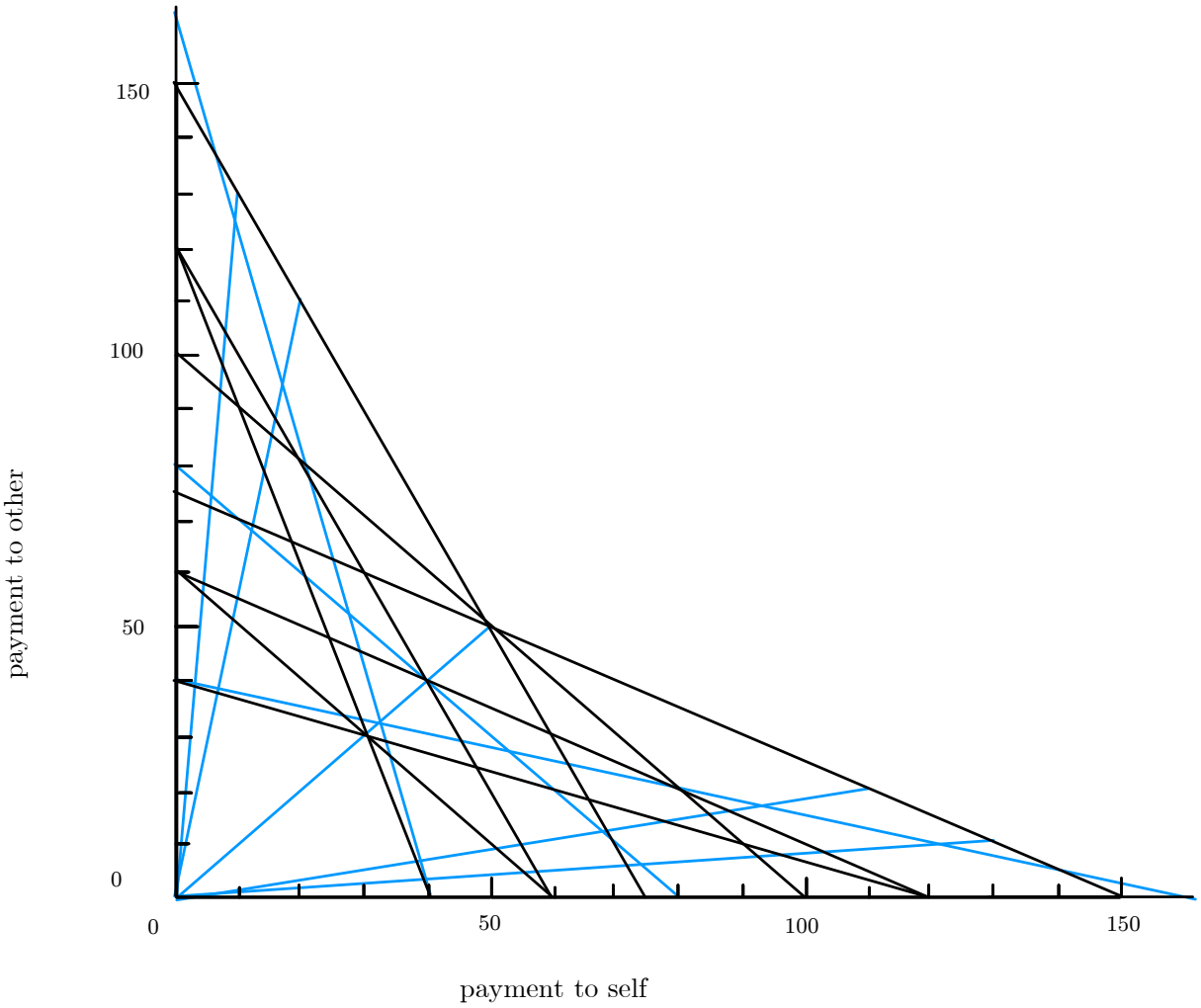
Divide 130 tokens: Hold 10 at 1 point each, and Pass 130 at 1 point each.
How many cents should each point be worth? (circle one) 0 1 2 3 4 5 6 7 8 9 10

Table 1

Allocation Choices

Budget	Token Endowment	Hold Value	Pass Value	Relative Price of Giving	Average Tokens Passed
1	40	3	1	3	8.0
2	40	1	3	0.33	12.8
3	60	2	1	2	12.7
4	60	1	2	0.5	19.4
5	75	2	1	2	15.5
6	75	1	2	0.5	22.7
7	60	1	1	1	14.6
8	100	1	1	1	23.0
9*	80	1	1	1	13.5
10*	40	4	1	4	3.4
11*	40	1	4	0.25	14.8

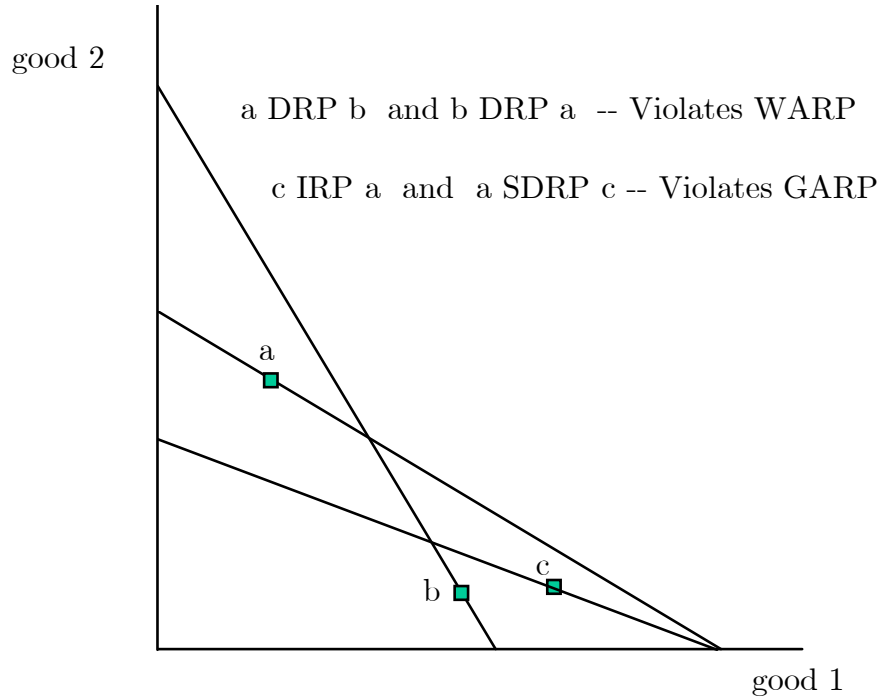
*Were only used in session 5, others used in all sessions



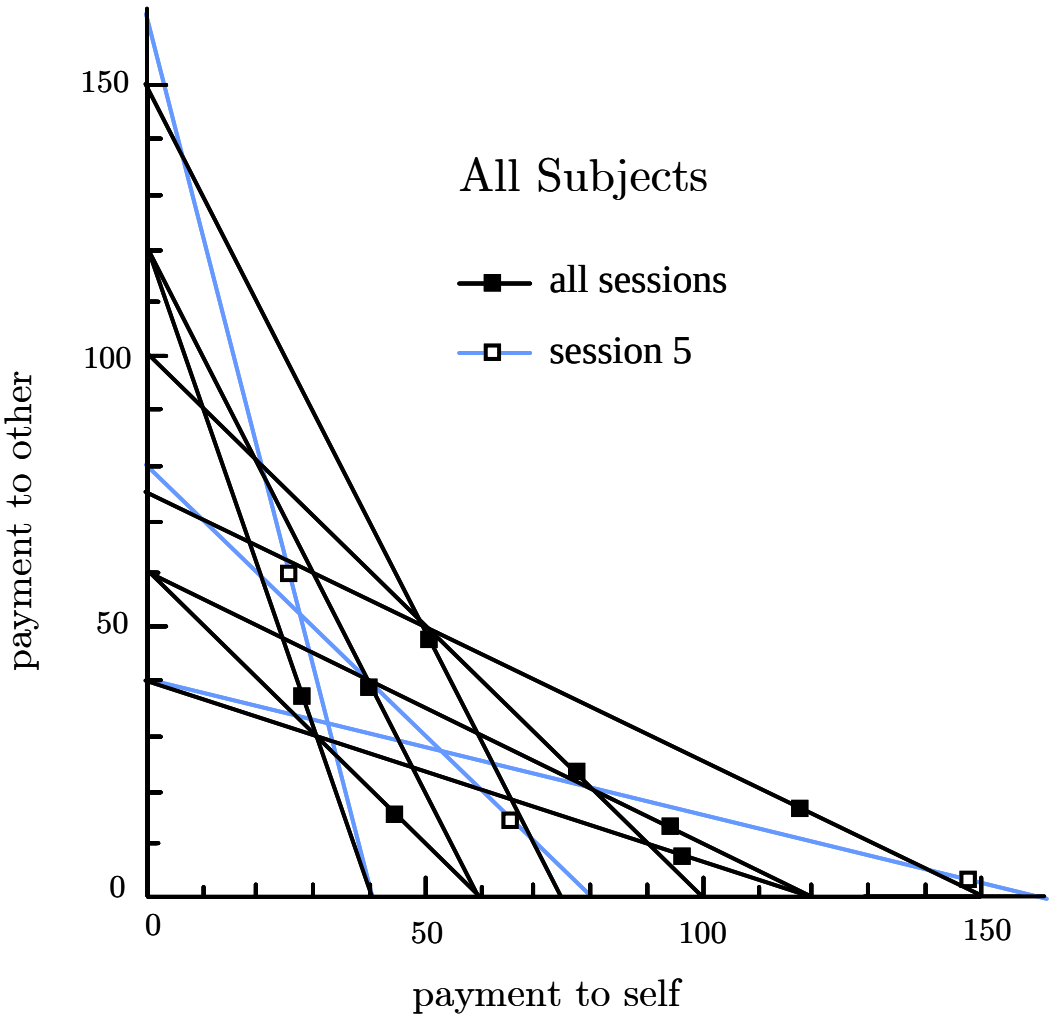
Budgets Presented to Subjects

3 Results

Weak Axiom of Revealed Preference (WARP)— If x is directly revealed preferred to y, then y cannot be directly revealed preferred to x.
Strong Axiom of Revealed Preference (SARP)—Two bundles x and y cannot be indirectly revealed preferred to each other.
Generalized Axiom of Revealed Preference (GARP)— If x is directly or indirectly revealed preferred to y, then y can never be strictly directly revealed preferred to x.



Note WARP $\Rightarrow$ SARP and GARP $\Rightarrow$ SARP, but not the opposite.
GARP allows for multi-valued demand functions.



Average Choices by All Subjects

Table 2

Violations of Revealed Preference

	Subject	Number of violations WARP	SARP	GARP	Critical Cost Effic. Index
Sessions 1–4	3	1	3	2	1*
	38	2	7	7	0.92
	40	3	8	7	0.83
	41	1	1	1	1*
	47	1	1	1	1*
	61	1	4	3	0.91
	72	1	1	1	1*
	87	1	1	1	1*
	90	1	1	1	0.98
	104	1	2	1	1*
	126	1	3	1	1*
	137	1	1	1	1*
	139	1	1	1	1*
Session 5	211	1	2	2	1*
	218	1	2	1	1*
	221	1	1	1	1*
	223	1	1	1	1*
	234	1	1	1	1*

*Indicates that an $\mathcal{E}$-change in choices eliminates all GARP violations.

How severe are Violations?

Afriat's Critical Cost Efficiency Index

- Define R as $p^t x^t \geq p^t y \Rightarrow xRy$
- Define $R(e)$ as $ep^t x^t > p^t y \Rightarrow xR(e)y$ for $0 \leq e \leq 1$
- Define GARP(e) as "if xRy then not $yR(e)x$."

What's the Power of the Test?

Table 2.1

Power of the Revealed Preference Test

	Percent with violations	Ave GARP Violations
Bronars' Power Test		
Sessions 1-4:	78.1%	7.5
Session 5:	94.7%	17.3
Bootstrapping Test		
Sessions 1-4:	76.4%	6.5
Session 5:	85.7%	9.6

Individual Preferences

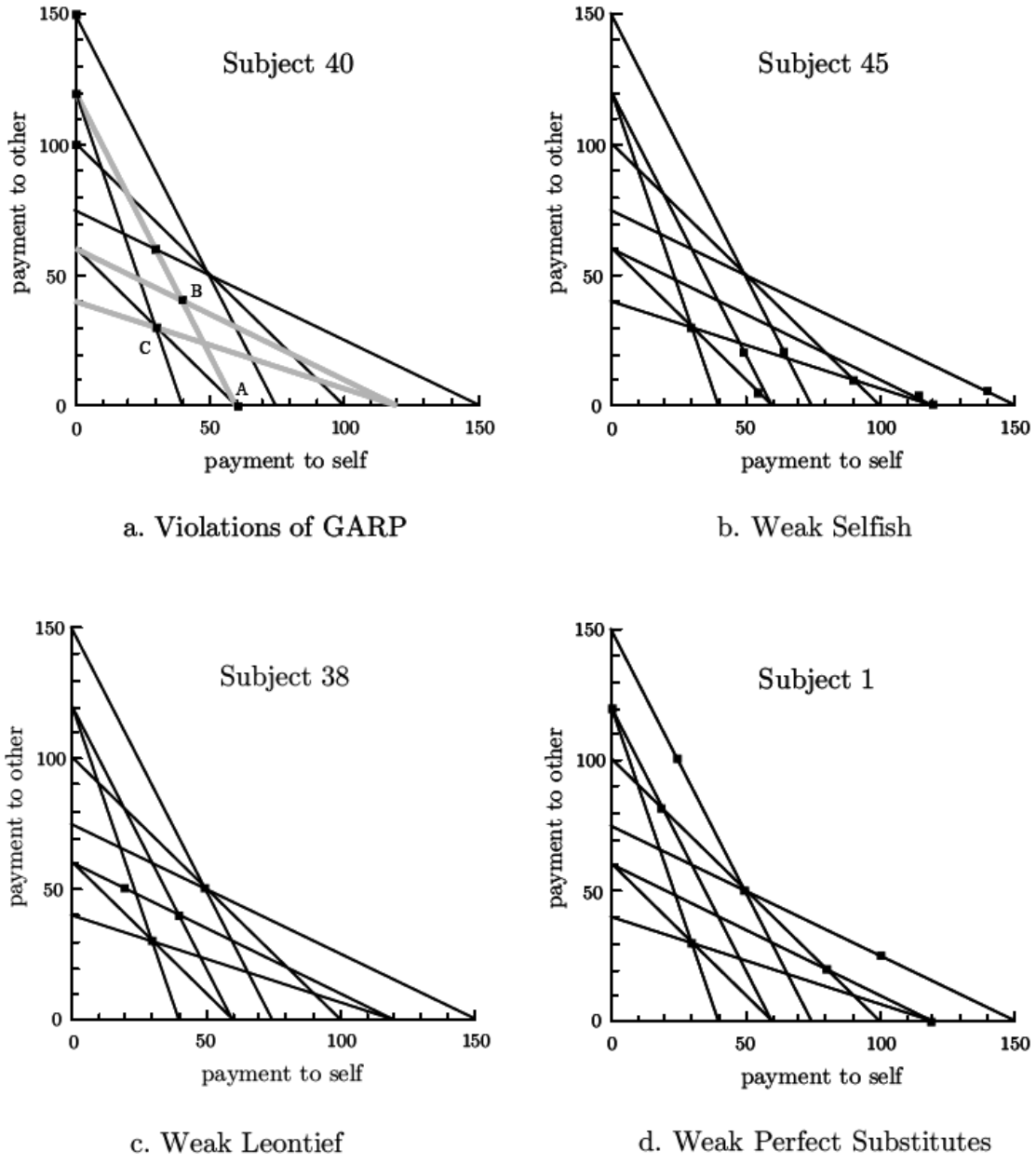


Figure 2: Analyzing Individual Preferences

Table 3

Subject Classification by
Prototypical Utility Function

	Fit		
Utility Function	Strong	Weak	Total
Selfish	40	43	83 (47.2%)
Leontief	25	28.5*	53.5 (30.4%)
Perfect Substitues	11	28.5*	39.5 (22.4%)

*One subject was equi-distant from strong Leontief and Substitutes.

Parametric Analysis

- Estimate utility functions for each weak type
  - CES Utility:

$$U_i = [a\pi_s^\rho + (1-a)\pi_o^\rho]^{1/\rho}$$

    Estimate parameters:

    $* \; A = [a/(1-a)]^{1/(1-\rho)}$

    $* \; r = -\rho/(1-\rho).$

  - All strong and weak types are from same U-function
  - Interpret differences with economic variables
- Use two-limit tobit.

Table 4

Estimates of parameters (standard errors) for CES utility functions for the three weak types.

Utility Function $U_i = [a\pi_s^\rho + (1-a)\pi_o^\rho]^{1/\rho}$

	Weak Selfish	Weak Leontief	Weak Perf. Subst.
$A = [a/(1-a)]^{1/(1-\rho)}$	20.183	1.6023	2.536
	(5.586)	(0.081)	(0.311)
$r = -\rho/(1-\rho)$	−1.636	0.259	−2.022
	(0.265)	(0.067)	(0.188)
a	0.758	0.654	0.576
ρ	0.621	−0.350	0.669
σ	−2.636	−0.741	−3.022
s.e.–self	0.2216	0.179	0.244
	(0.011)	(0.009)	(0.014)
ln likelihood	−107.620	52.117	−69.583
number of cases	380	230	242

Estimated Indifference Curves

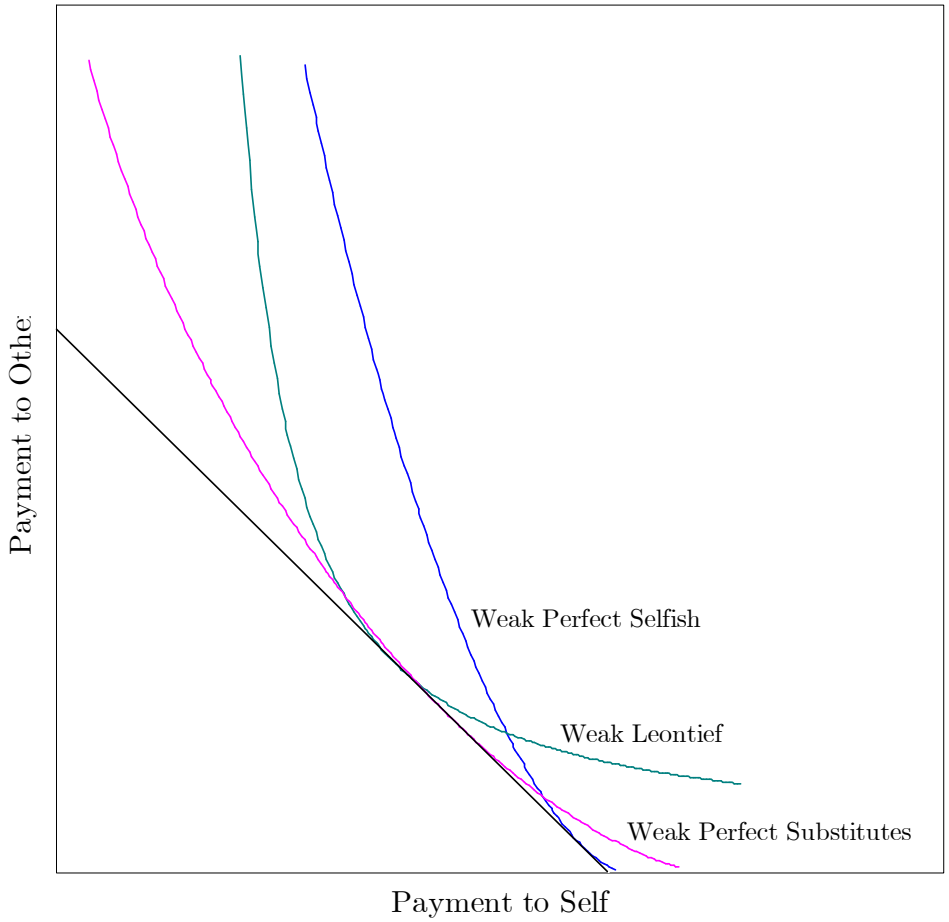


Figure 3: Estimated Indifference Curves

4 Comparisons to Results of Other Studies

Predicting Results

- Predict for each type
- Aggregate with population weights
- Generate predicted “Aggregate Demand” curves

Dictators Games:

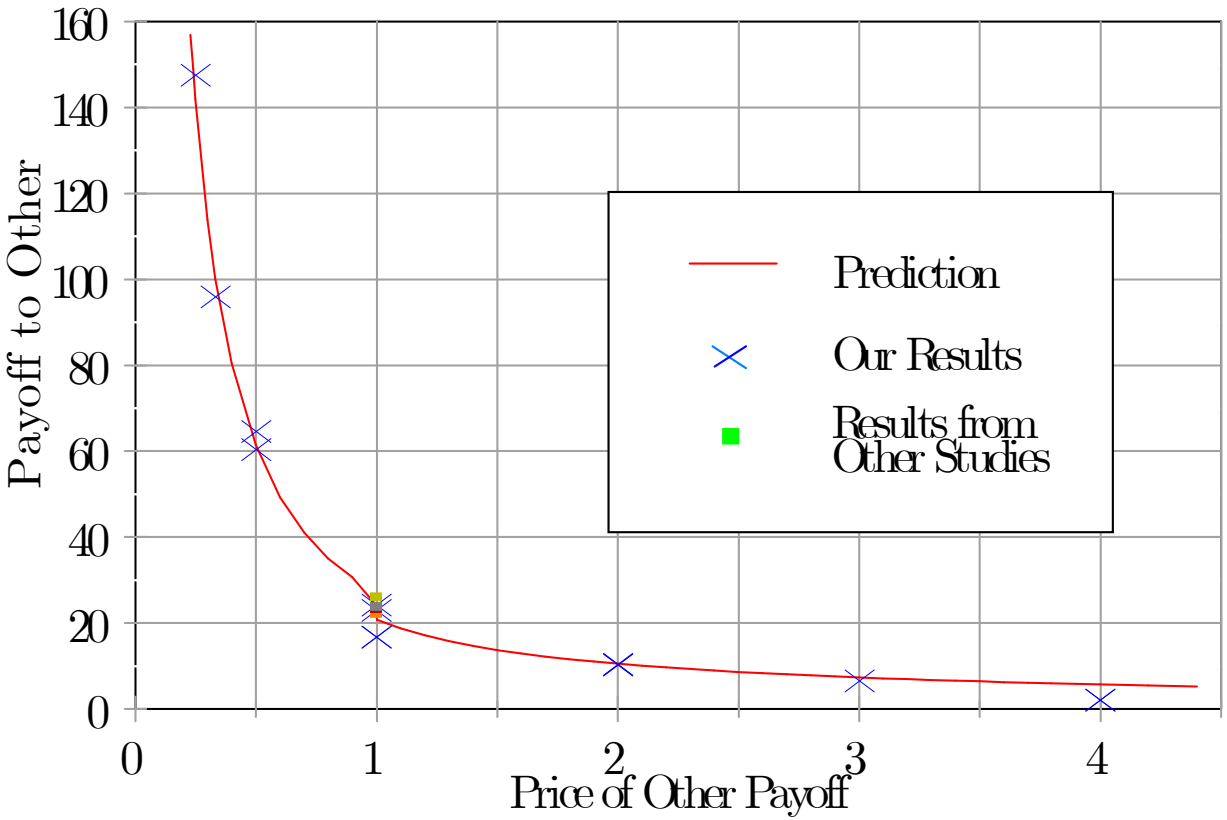


Figure 4: Payment by Dictator with Endowment of 100

Public Goods:

Subjects choose x and g subject to a **tokens budget**

$$x + g = m$$

For a given choice of x and g,

$$\pi_s = x + \alpha g$$

and

$$\pi_o = \alpha g.$$

Substitute to get a **payoff budget**:

$$\pi_s + \frac{(1-\alpha)}{\alpha}\pi_o = m.$$

Let $p = (1-\alpha)/\alpha$, then problem is identical to

$$\max_{x,g} u(\pi_s, \pi_o)$$

$$\text{s.t. } \pi_s + p\pi_o = m$$

So, linear public goods games are like multi-person dictator games.

However...

- 4 to 100 people $\rightarrow$ *We use only 4 or 5 person groups.*
- Learning may matter$\rightarrow$ *We use only the first iteration.*
- But strategies may matter$\rightarrow$ *Use only final round.*
- Public goods are censored differently than dictator games
  - Dictator: $0 \leq \pi_s \leq m$
  - Public goods: $\alpha m \leq \pi_s \leq m$.

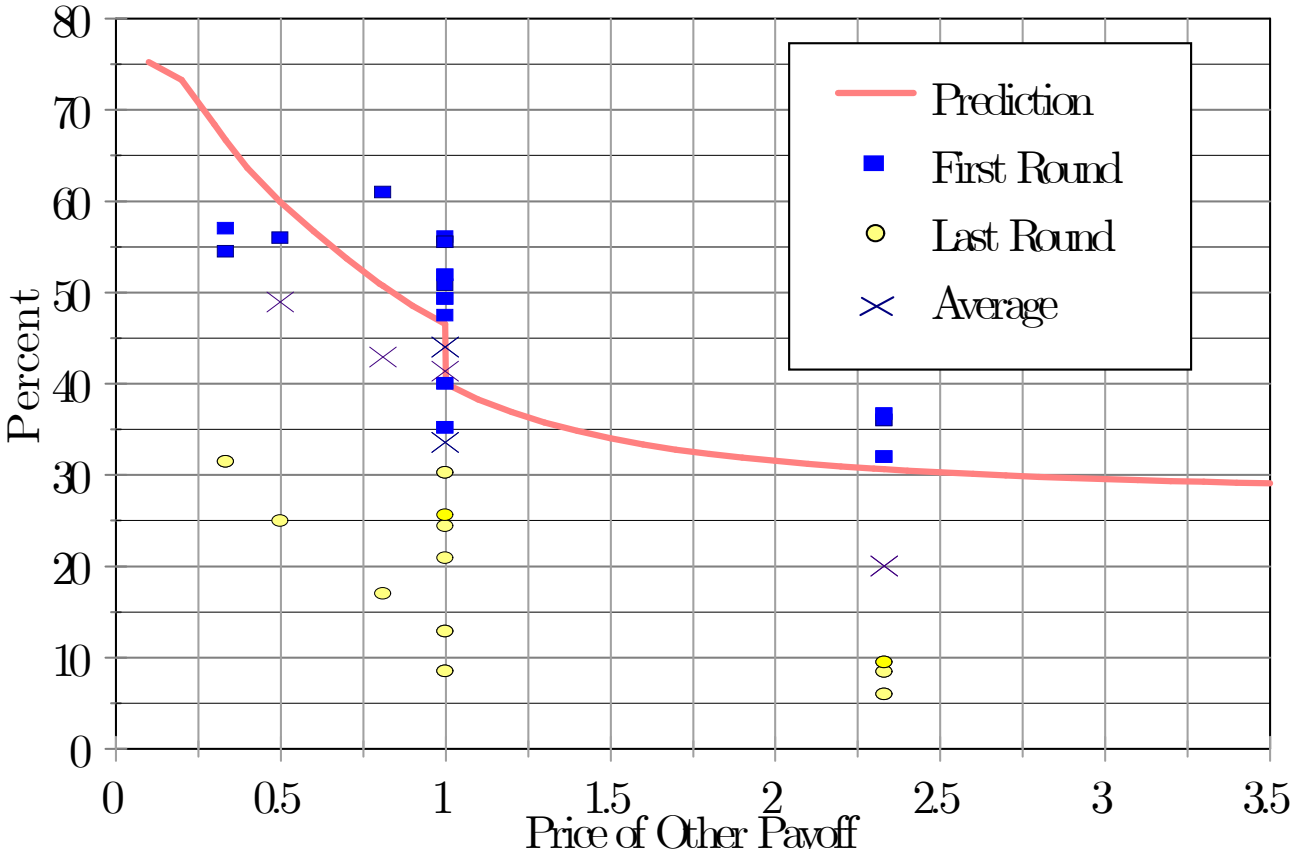


Figure 5: Percent of Endowment in Public Good, Predicted and Actual

5 Are Preferences Monotonic?

Divide 130 tokens: Hold 10 at 1 point each, and Pass 130 at 1 point each.

How many cents should each point be worth? (circle one) 0 1 2 3 4 5 6 7 8 9 10

Table 5

Choices on Upward Sloping Budgets

	Budget				
	U1	U2	U3	U4	U5
Definition of Budgets:					
Self allocation in tokens	130	110	50	20	10
Other allocation in tokens	10	20	50	110	130
Results:					
Average valuation per token*	9.94	9.76	9.71	9.03	8.97
Standard deviation	0.3	0.9	1.2	2.1	2.6
Number of valuations < 10	1	3	2	8	7
Percent of subjects	2.9	8.8	5.9	23.5	20.6
Average valuation if < 10	8.0	7.3	5.0	6.4	5.0
Max	8	9	5	9	9
Min	8	5	5	2	0

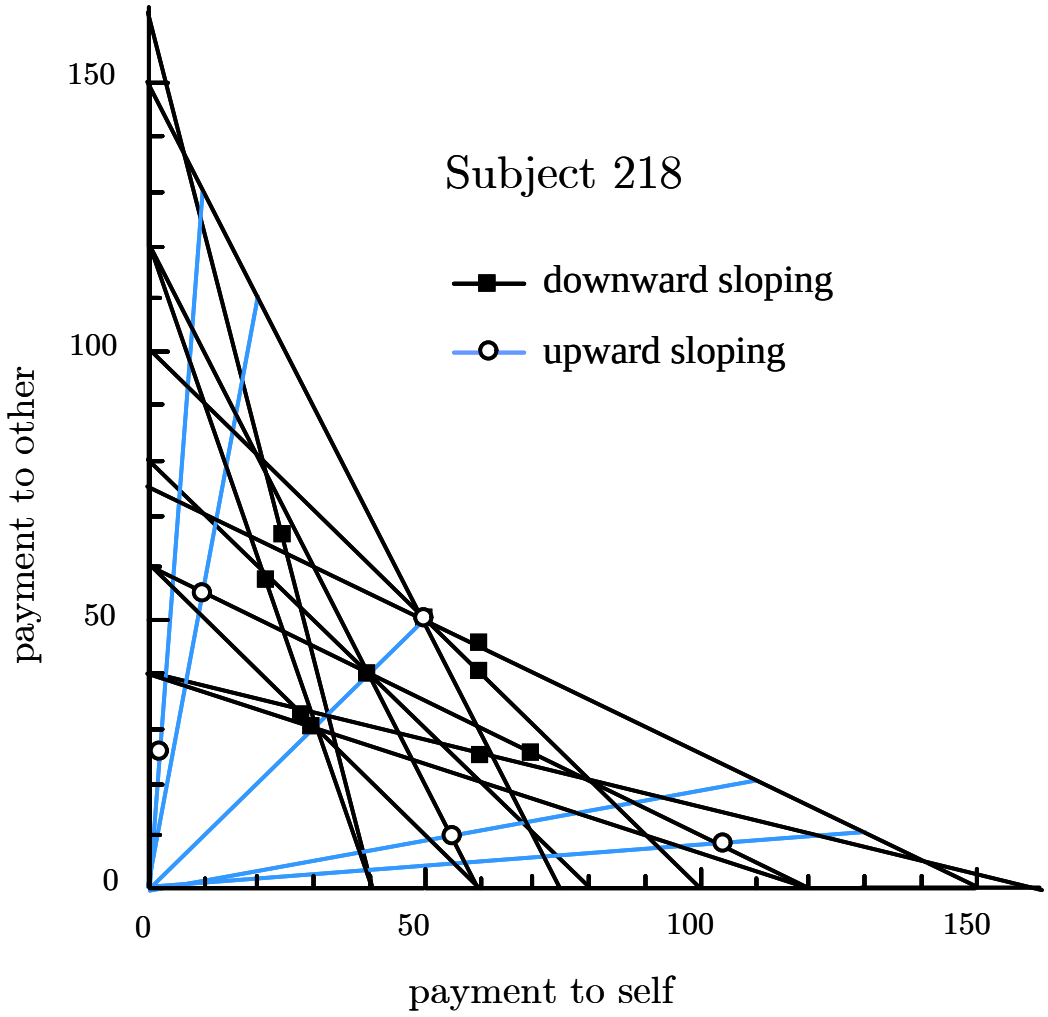
*Subjects choose to value all tokens from 0 to 10 cents each.

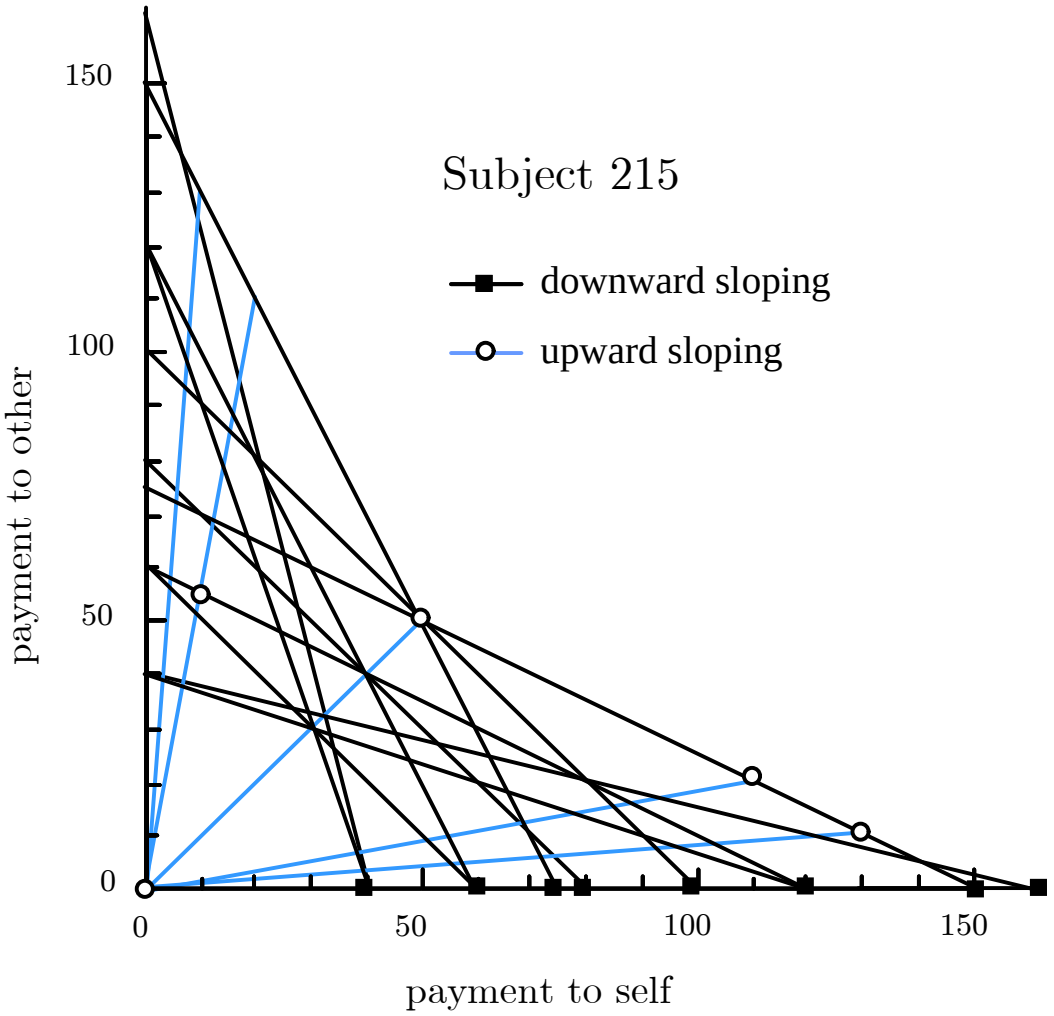
- 88% of valuations at 10 — 77% of subjects purely monotonic.
- Most “shrinking” at unfavorable budgets, U4 and U5.
- Only 1 time was valuation zero.
- Can strongly reject linear indifference curves.

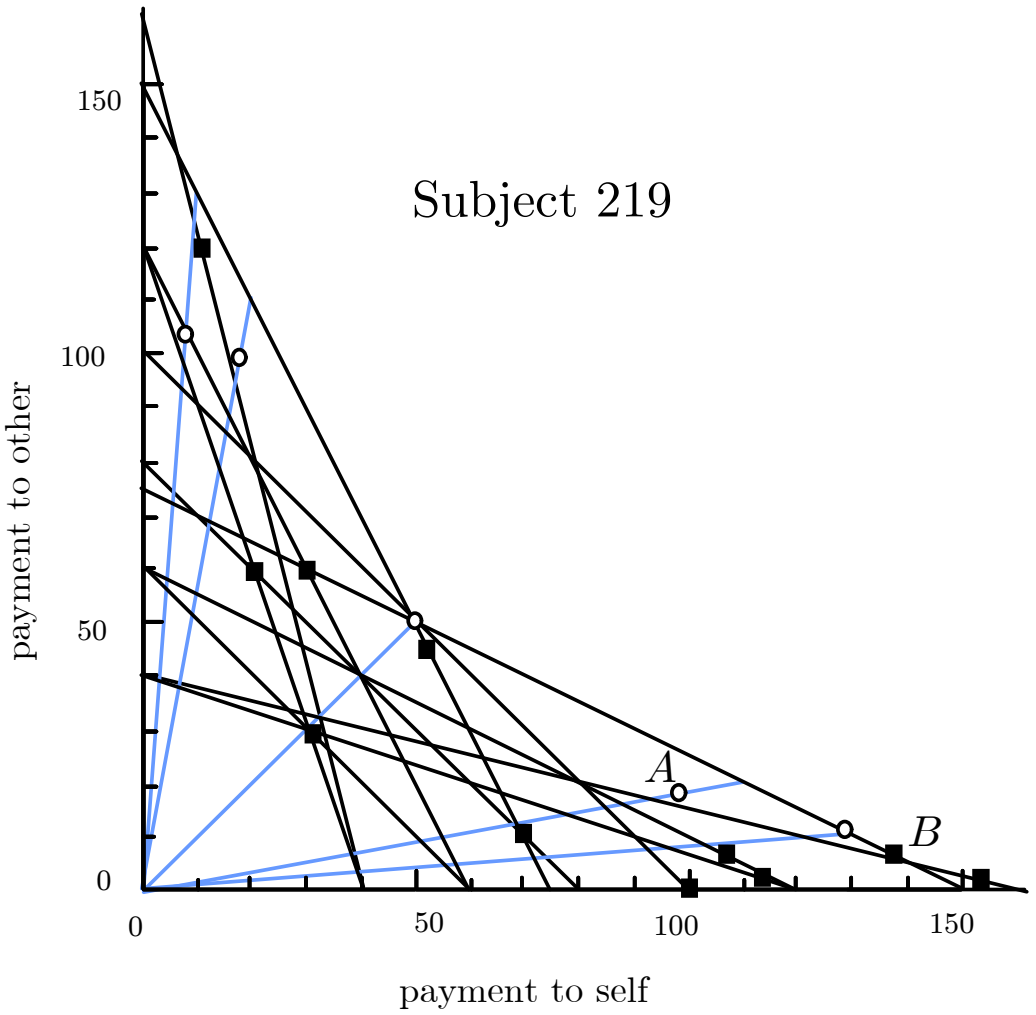
Conclusion:

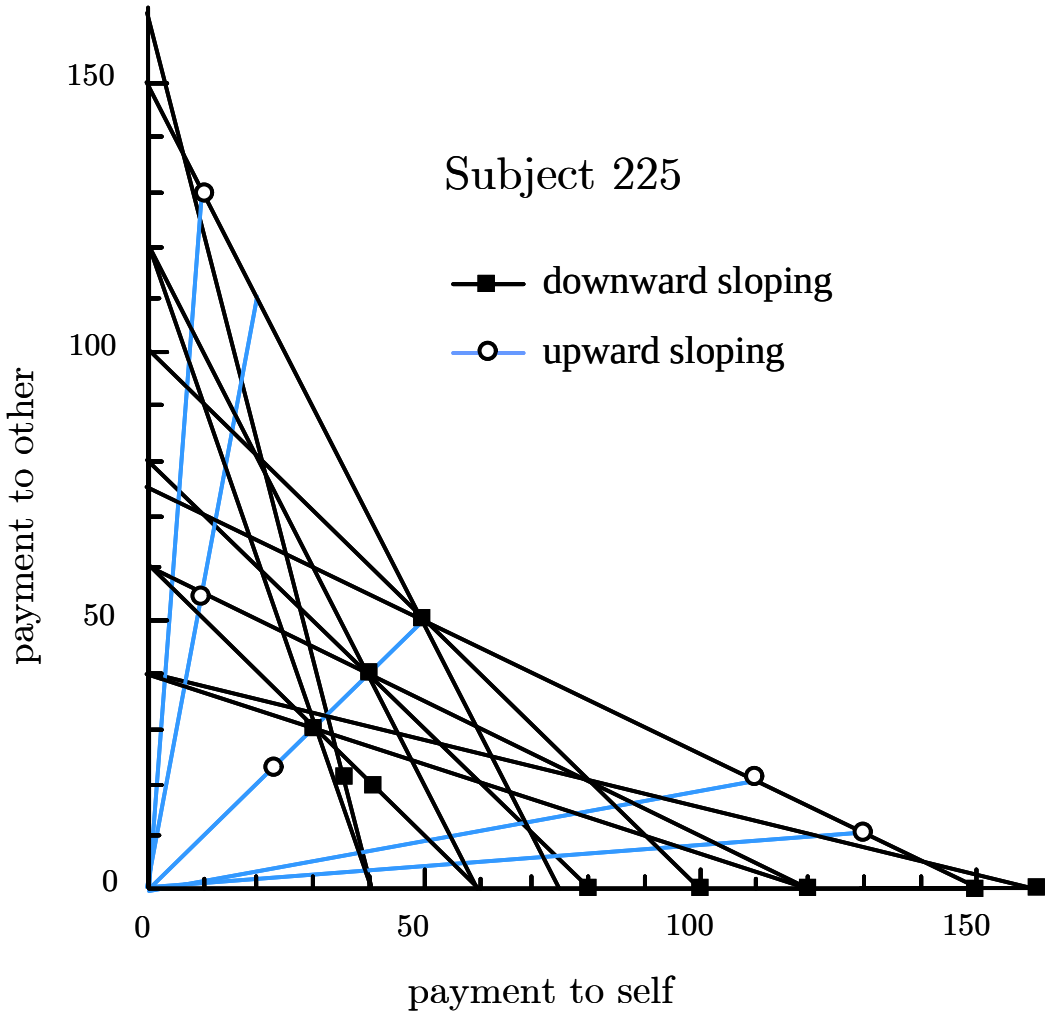
- Significant minority are convex but not monotonic.
- Disadvantageous inequality matters most.

Are non-monotonic preferences still rationalizable?




Subject 215
downward sloping
upward sloping
payment to other
payment to self
0
50
100
150
0
50
100
150


Subject 219
150
100
50
0
payment to other
0
50
100
150
payment to self
A
B



Of the 8 non-monotonic subjects, 4 are still convex.

6 Conclusions

- Utility theory works.
  - Rules, motivations, psychology can be expressed with U-functions
- Heterogeneity of preferences matters.
  - Not one notion of fairness
  - Accounting for heterogeneity important in future work.
- Preferences are largely monotonic in static, non-strategic setting
  - Significant minority of convex but not monotonic preferences
- Careful and systematic variation can allow subjects to reveal what matters